Supersonic Boom—A New Weapon?

FLYING

THE WORLD'S MOST WIDELY READ AVIATION MAGAZINE

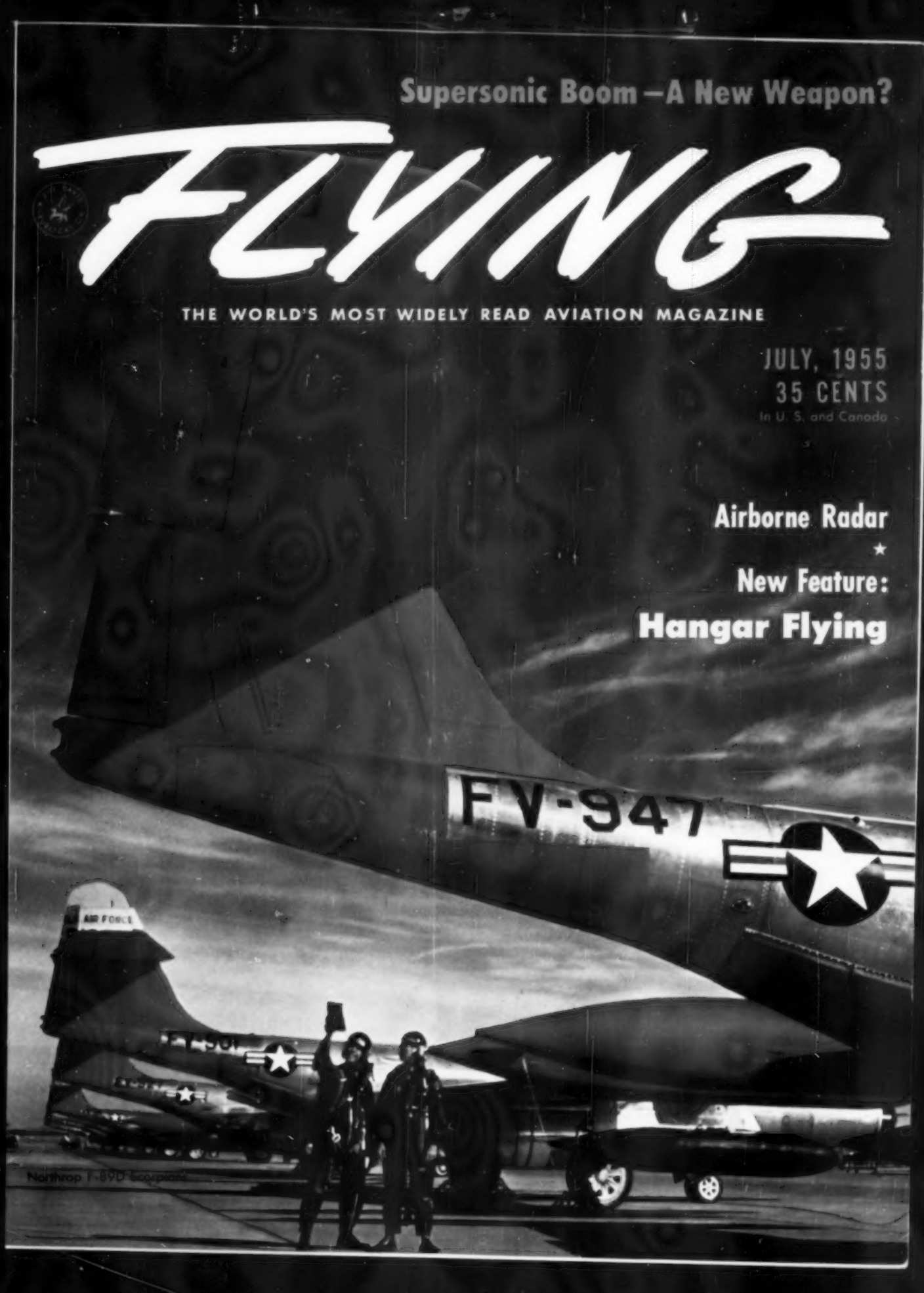
JULY, 1955
35 CENTS
In U. S. and Canada

Airborne Radar

★

New Feature:

Hangar Flying



Northrop F-89D Scorpion

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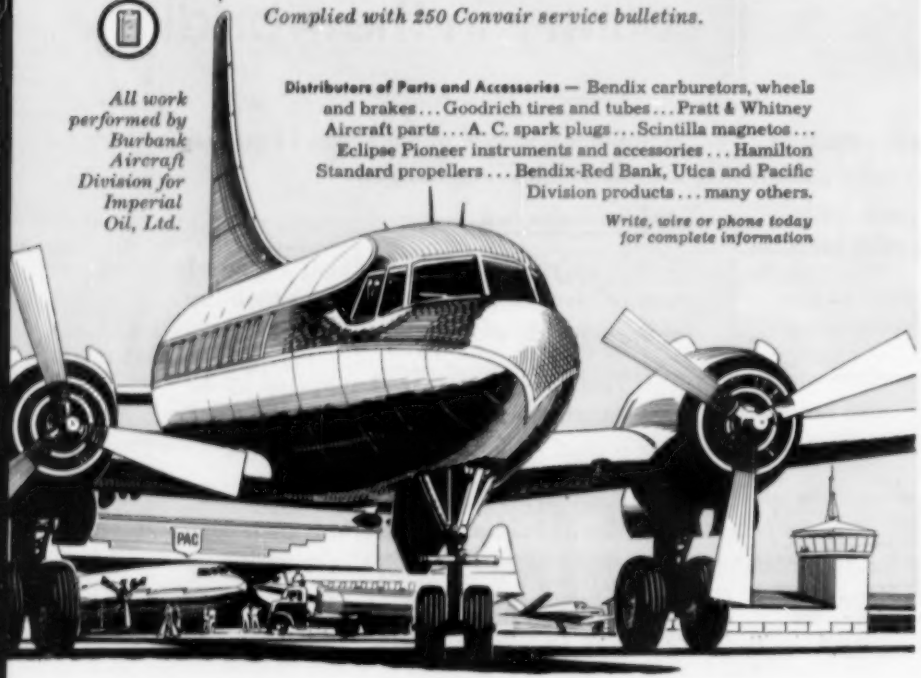

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THE COVER: Val Hawes of Northrop made this striking photo of F-89D Scorpions. See page 60 for story.

FLYING

Reg. U. S. Pat. Off.

WILLIAM B. ZIFF (1898-1953) FOUNDER

JULY, 1955 VOLUME 57, NUMBER 1

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MAILBOX

KOREAN GI BILL

We very much appreciate the paragraph on page 10 of the April issue of FLYING, dealing with starting flight training under the Korean GI Bill. However, it's not quite right, and we're afraid a lot of veterans are going to get an erroneous impression about when they have to begin. [The paragraph stated that veterans have until August 20 to enter flight training under the Korean GI Bill.]

The law passed by the 83rd Congress, which you mentioned, allows a veteran three years from the date of his discharge to start Korean GI Bill training. It doesn't move the deadline for starting up to August 20 of this year.

Each Korean veteran, in effect, has his own individual deadline: three years from discharge. And if he wants to train, he must begin before that date.

We thought you'd want the correct facts. If you can find room to mention them, it would help quite a bit.

J. NORMAN LODGE
Director of Information
Veterans Administration
Washington, D. C.

HANGAR HOUSE

In your February issue you ran an article called "Hangar House." I was very much interested in it because we have just opened what we believe to be the first subdivision of its kind in the Chicagoland area similar to that mentioned in the article.

Our project has 31 lots 100 x 350 feet, with a taxi strip across the back to the airport. The development is located at Route 53 and Army Trail Road, just north of Lombard, Ill., and 20 air miles west of Chicago's loop. It was made possible through the co-operation of Thomas Mitchell, owner of Mitchell Field and Chicagoland Seaplane Base, Inc., operators of the airport.

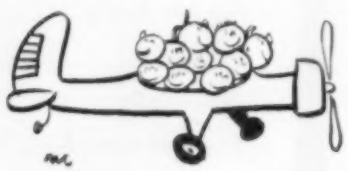
LEONARD E. BOESKE
102 W. Park
Elmhurst, Ill.

ONE WAY UP

I am a minister of the Gospel and the congregation with which I am now working has 10 boys between the ages of 11 to 15 who are intensely interested in flying. We got together recently and decided we wanted to meet on Saturday afternoons and do things together as a group. As to what we would do, it was not long until their real desire was known. They wanted more than anything else to work with or on airplanes —someway, somehow. I started scouting around for suggestions to see if I could locate some small "non-flyable" aircraft which they could use in getting acquainted with a real plane.

Among my scoutings, I contacted Mr. Jack Robinson of Jack Robinson Flying Service, the genial Piper dealer based at Meacham Field, Fort Worth. Mr. Robinson said he would donate all the component parts to complete a 65-hp engine —from prop to mount. All the parts are used and, of course, we have no intention of ever powering a plane with it. But it is a start, and it will run. This will at least put one pillar of a solid foundation under some of the flying dreams which these boys have rapturously envisioned. While I was there, Mr. Robinson acquainted me with two of his right-hand men, John Hull and Les Guthrie, who are ready and willing to help with any advice or hints they may give us.

I was pleasantly surprised when Mr. Robinson made the offer—so much so that I told him I would like to bring the boys out to meet him. He said he would



be happy to meet them and when they came out he would take them all for an airplane ride! Well, you should have seen their faces when I told them that! Mr. Robinson also said he would like to visit our "shop," once it is set up. He gave us pictures of planes and also calendars to put up in the shop to keep the atmosphere homogenous.

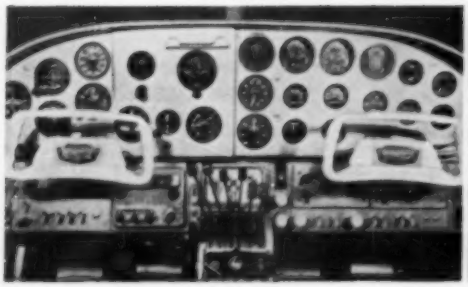
The boys are going to be inviting all their friends who are interested in aviation, especially at this time those who would like to have a part in putting a real airplane engine together. I believe this has real possibilities. The interest is high. Is not this just one good way to fertilize aviation in its "grassroots" among our youth?

We are indebted and grateful to Mr. Robinson for the suggestions and materials he supplied. Without them we could not begin our activities. What

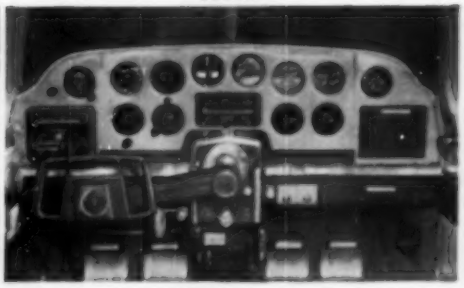
(Continued on page 8)

More LEAR VHF radio is being installed than all other makes combined

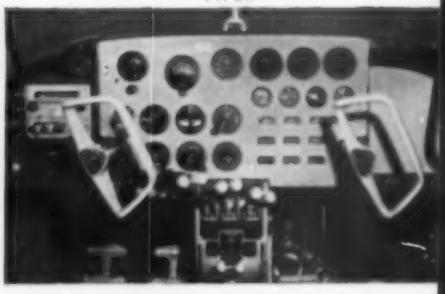
CESSNA



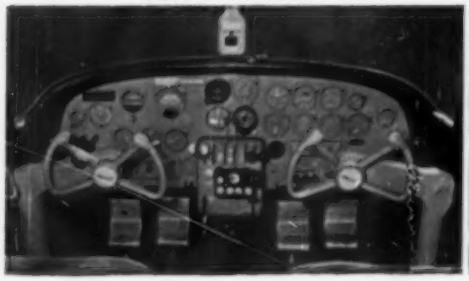
BEECH



PIPER



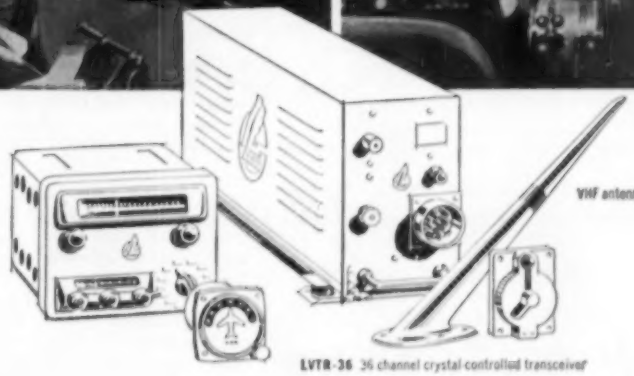
AERO COMMANDER



BELL

CAMAIR

LTRA-8 VHF transceiver, OmniMeter, LF receiver



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MAILBOX

(Continued from page 6)

aviation needs is more fellows with his kind of heart. I know my boys think his is as big as the sky.

LEE A. KREIDEL

Azle, Tex.

LONG LIVE GOODRICH!

An orchid for the personnel of the Goodrich hangar and control tower operators of the Akron Municipal Airport.

While on a cross-country trip from Toledo to Johnstown, Pa., we ran into some bad weather over Akron and landed. A snow storm grounded us there for several days. The personnel of the Goodrich hangar tied our ship and blocked the wheels. It was there for a week and I could hardly believe it when I was informed there would be no tie-down fee.

The tower operator kept an eye on the plane and requested that the Goodrich people set the flaps as the storm was hard on the control surfaces.

They all were wonderful, thoughtful and courteous to me as a transient pilot.

THOMAS J. SCHRAMKO

Toledo, O.

THE BIG PAYOFF

I am a private pilot with military flight experience and a collector of aviation books and magazines. I would like to tell you how much I enjoyed your March issue of FLYING. The article "The Big Payoff" is one of the most interesting things I have read in years.

I would like to see more about CAP in future issues of FLYING; in fact I'm going to see if I can join the organization myself. I feel this CAP program for Cadets can build the future strength in the air we are going to need one day.

WALTER F. COX

Seattle, Wash.

● *There's a recruit for the Seattle CAP unit. If all such letters we get from readers are any indication of potential recruit material, CAP should have mighty few personnel worries.*—ED.

KIND WORDS

I have been a reader of FLYING Magazine for a number of years now and would like to commend you on the carefully selected material that you use in each and every issue. It is gratifying to read an article that is informative, yet not technical. I believe that FLYING is a direct reason for the present growth that private flying is now undergoing. Keep up the good work.

BOB BODE

Abilene, Tex.

YOU AND INSTRUMENTS

Your feature "You and Instruments" by Colonel Duckworth was most interesting and certainly a great contribution to private flying which, to my mind, is the most important reserve for national defense. Nothing has held back the expansion of private flying more than the owner's inability to go where he wants and when he wants due to unfavorable weather.

CLARENCE D. CHAMBERLIN

Shelton, Conn.

. . . Your series on Basic Instruments should be *mandatory* reading for all pilots.

PAUL L. BRADLEY
Grant Advertising Agency

Los Angeles, Calif.

. . I have just read the first part of "You and Instruments." What a wonderful idea!

W. MEZGER

Paris, France

. . I certainly enjoyed reading "You and Instruments" in the last two issues of FLYING. It was a wonderful book and will certainly make flying safer for anyone who will read and heed it.

A. G. THOMPSON

Hamilton, Tex.

RAPID CITY SHRINERS

I was pleasantly surprised when I opened my April issue of FLYING and found a letter from Noble Ed Calahan regarding the flying Shriner Air Patrol of Denver, Colo. I wish to thank Noble Calahan for his mention of the Naja Rapid City Air Patrol Unit.

We in Rapid City acknowledge our limited railroad transportation but are very proud of the air travel in and out of Rapid City by both commercial and private aircraft.

The Naja Shrine Rapid City Air Patrol boasts of having the largest and most active Shrine Air Patrol in the country. We were organized in 1951 with only six planes and six pilots who were members

of Naja Temple. Since that time we have grown until we have 30 qualified pilots. Our planes include Cessna 195's, 190's, 180's, 170's; Piper *Cruisers, Tri-Pacers, Pacers, Navions,* Beechcrafts, Bellancas, Stinsons, and *Ercoupes.*

Since our organization in 1951 we have flown a total of 67,650 plane miles, have carried 291 passengers, making a total of 21,486,150 passenger miles. All of this flying has been done without incident or plane trouble. We are proud of our unit and believe we have one of the most distinctive organizations in the country.

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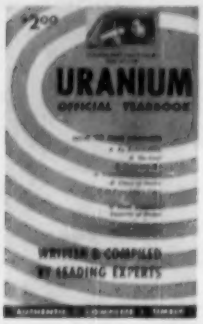
Briefings . . .

HOW TO FIND URANIUM is the job tackled by the "Uranium Yearbook" Sample chapters indicate the scope: How to recognize uranium; Where to look for uranium; How do counters work; How to build your own Geiger counter; How to stake a claim; Uranium stocks; How to prospect for uranium — on foot, in a car, in a plane. The book is available from New Science Press, 5204 Santa Monica Blvd., Los Angeles 26, Calif. Price $2.00.



THE GROWING AIR TOURIST passenger market was the most important factor during 1954 in the air transportation industry, according to Ralph S. Damon, president of TWA. He emphasizes that internationally the story is even more pronounced than in the United States, with tourist travel the standard, and first class considered luxury travel.

CHICAGO'S MIDWAY airport led all other airports in the nation in number of aircraft arrivals and departures in 1954. It was the third straight year that Midway placed first in air traffic. Second place for 1954 went to Los Angeles.

NEW LOOK in airliners is represented by these long, thin turbo-prop engines in Trans-Canada Air Line's new *Viscount*. TCA has ordered 22 of the

320-mile-an-hour planes and will be ordering more soon. First ride in a turbo prop airliner is quite an experience for most passengers—there's no deep roar, practically nil vibration, and those king size Rolls-Royce engines really pur.

AUTOMOBILE GASOLINE is dangerous when used in aircraft, warns CAA's Office of Aviation Safety. "The high octane rating of today's automobile fuels has led many small-plane owners to believe they can use such fuels safely. We are receiving numerous reports of owners attempting to save money in this way. Automobile gasoline has a vapor pressure of 8 to 13 pounds, while aviation gasoline has a vapor pressure of 5 to 7 pounds. The low vapor pressure in aviation gasoline is insurance against vapor lock caused by altitude or heat."

RECENTLY FORD officials investigated the possibility of building 200 Model T's to commemorate the 50th anniversary of the model. They were startled to find that it would cost between $50,000 and $75,000 per car to produce this limited number, compared to the $295 factory price tag back in the twenties. Aircraft and helicopter manufacturers could have saved them the time it took to find that out.

A SINGLE-AXIS AUTOPILOT that weighs less than three pounds and will cost less than $400 including all installation charges, will be marketed this

summer by Air Associates. Operating on the principle of rudder control and rate of turn sensing, the DART I (Direction and Rate of Turn) was developed by Monroe Sweet and James Casterlin of Navigation Devices, Inc. It will be manufactured by Air Associates. Installation is extremely simple, includes a Bendix Pioneer 1700 series air driven Turn and Bank, and one actuator. The entire equipment is shown above. It can be installed on any plane which can be operated by rudder control and which has an electrical system.

FOR THE FIRST TIME in their history, engine manufacturers are building more different models of jet engines than of piston engines.

OKANAGAN HELICOPTERS LTD. of Vancouver, Canada has become the largest commercial helicopter organization on the North American continent. The Okanagan group of companies now operate a total of 22 Bell helicopters and 8 Sikorsky S-55's.

LLOYD BELL, operator of the privately owned commercial airport at Baraboo, Wisc., has solved the basic economic problem of such fields. He has leased his runway areas so that the City of Baraboo and the County contribute equally and reimburse him in monthly payments. Bell's flight and other operations remain entirely his. He provides an outside phone, U-Drive-It cars, neat office, as well as snow removal and mowing service.

DEVELOPED FOR THE NAVY by International Telephone and Telegraph Corp., the controversial TACAN (tactical air navigation) radio navigation system is undergoing tests aboard aircraft

carriers. Shown here is a test antenna located on top of 300-foot microwave tower of Federal Telecommunication Laboratories at Nutley, N. J., research division of IT & T.

TAKING A LONG LOOK at the potential growth of the air transport industry, the Visual Flight Rules Committee of the Air Transport Association has stated that it sees a need in the future for an aircraft proximity warning indicator. The committee has asked electronic manufacturers to give the airlines their opinion as to whether or not such a device is practical.

DELIVERY TO SWITZERLAND of a Cessna 310 was made recently by Jack Ford, president of Fleetway, Inc., a professional flying service located at Burbank, Calif. Extra equipment for the trans-Atlantic flight included a low-frequency slave radio with output of 100-watts, and 150 gallons of extra fuel. Course flown was Wichita, New York, Gander, Greenland, Iceland, Prestwick, Zurich.

GARRETT CORPORATION of Los Angeles has broken ground for a new $1,300,000 administrative and engineering

office building, an extensive addition to its present AiResearch Manufacturing Division plant adjacent to Los Angeles International Airport.

CONSTRUCTION of the first amateur-built airplane of postwar design in Britain has been announced by Peter Masefield, chief executive of British European Airways and president of the Popular Flying Association. It is a two-seater *Turbi*, designed by Roger Druine and fitted with a Walter Mikron piston engine. It

(Continued on page 12)

FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau

FRONTS..

These boundary edges of air masses produce much of the weather affecting flight.

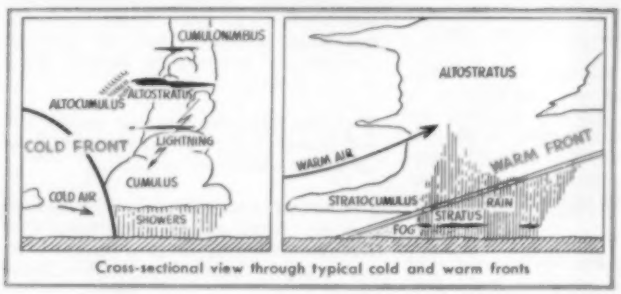
FRONTS may extend for hundreds of miles and cannot be avoided by local course changes, nor can they be topped at altitudes attainable by many planes. By understanding the principal features of FRONTS, however, it is possible to recognize them and make adjustments to the flight plan accordingly.

Here are the frontal characteristics:

COLD FRONTS—the advancing edge of a cold air mass: Showery type of rain or snow, thunderstorms—Cumulus-type clouds—Sudden wind shift after the storm, usually to W, NW or N—Drop in temperature after wind shift. Clearing weather, sometimes slow.

WARM FRONT—retreating edge of a cold air mass overrun by warm air: Steady precipitation—not showery—Stratified cloud layers—Gradual wind shift to S, SW or W—Rise in temperature and humidity—Temporary clearing.

OCCLUDED FRONT—The upper front resulting from collision of cold front and warm front: Best recognized on weather chart, but when events indicate a mixture of cold front and warm front characteristics, it's likely an occlusion has taken place.



Cross-sectional view through typical cold and warm fronts

Best Pair to Get You There!

The more you know about the weather, the greater your chance of predicting its performance. The same is true of the products that power and protect your engine.

Pilots who use Mobilgas Aircraft and Mobiloil Aero know they exceed rigorous Army and Navy specifications . . . that they've been first choice of air pioneers—Lindbergh, Earhart, Byrd and many others. It's safe to predict that with these products in your plane your engine will run smoother . . . perform better than ever. *Fly safely . . . Fly with the Flying Red Horse!*

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Mobilgas AIRCRAFT

SOCONY MOBIL OIL CO., INC., and Affiliates:
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EXCEEDS IFR STANDARDS

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OMNIGATOR

You can use virtually every modern VHF navigation aid available today with the compact Narco Omnigator installed in your airplane—Omni, ILS, VAR, 75 mc marker beacon plus high-powered transmission and VHF reception.

± 2° ACCURACY

New improved design features now permit the highest degree of VOR bearing accuracy far exceeding IFR standards. Every Omnigator is individually checked and factory-certified to have better than 2° accuracy (3° required for IFR). Large-scale dial permits precise course selection.

PLUS these features:

- **ILS Localizer** for accurate runway approach guidance.
- **75 mc Marker Beacon** for positive position checks.
- **VAR Navigation** on visual aural range.
- **8-CHANNEL, 3-WATT TRANSMITTER** for powerful long-range transmission.
- **VHF RECEIVER.** 108-127 megacycles with temperature compensation for tuning stability.
- **INSTALLATION EASE.** The Omnigator is compact for glove compartment mounting. Thousands of Omnigators in use in multi- and single-engine business aircraft. Priced far lower than any comparable equipment. See your NARCO dealer today.

and the SUPERHOMER

Dependable, low-cost Omni, with 4-channel VHF transmitter and tunable receiver. By far, the most popular OMNI in use today.

New "HOW TO FLY OMNI" booklet now available. See your nearest NARCO dealer or write for your FREE copy.

narco
NATIONAL AERONAUTICAL CORPORATION
Ambler, Pennsylvania

Briefings . . .

(Continued from page 10)

will do 80 miles an hour and will probably cost its builders about $850. It is being built by a group of students of the de Havilland Aeronautical Technical School in their spare time and at their own expense.

FAR RANGING JET aircraft will receive extremely long range navigation aid from an experimental radio station being constructed at Camden, N. Y. Using a new system called Navarho (pronounced Nav-a-row), the station will beam information 2,500 to 3,000 miles in all directions.

IF YOU HAVE the type of gas gauge in which a thin rod projects up from the gas tank, try inverting an empty tin can over the gauge when you park in the open. This will prevent seepage of water during a rainstorm.

WAYNE THOMIS, aviation editor of the Chicago Tribune (left), receives the Tribune's second twin-engine Aero

Commander from O. B. Callan, Aero distributor in the Chicago area. The Tribune was the purchaser of the first production *Commander* three years ago.

SITTING DUCK is not the name for the helicopter that gets involved in a dog fight with a modern airplane, according to Maj. Gen. Edwin A. Pollock of the Marines. General Pollock maintains that it is harder to hit a helicopter traveling under 150 mph than it is to hit a jet fighter.

UNITED AIRLINES has become the first airline in the world to begin fleet installation of C-band radar as standard equipment. The company has signed a contract with RCA for delivery of 200 C-band airborne radar units at a total cost of $2,500,000. Modification of the planes and installation will require another $1,500,000.

REMMERT-WERNER, executive aircraft specialists of St. Louis, have a collection of data and historical information on the DC-3 which is second to none. They state that of almost 12,000 DC-3's and C-47's built, about 6,000 are still in full active operation. Other thousands of perfectly good C-47's were abandoned on Pacific islands and jungle or desert airstrips throughout the world in the rush to disarm and economize after World War II, and still lie there undisturbed, corroding and disintegrating.

LARGE ALUMINUM SPHERES attached to a power line make it clearly visible to aircraft landing and taking off from the Ada, Ohio airport. Painted a bright international orange, the spheres weigh about four pounds each, are manufac-

tured in two halves. They are installed by clamping the bottom half to the wire and fastening the top half over it with screws. The Mutto Manufacturing Co. of Canton, Ohio, which makes the spheres, suggests they be installed at 20 or 30 feet intervals at danger points.

AEROTRON'S Model 300 VHF tunable type receiver is now being marketed by Air Associates. Covering the frequency range of 108 to 128 mc, it can be supplied for Civil Defense, CAP and other uses on special order. It weighs less than 1½ pounds, is designed for accommodation of an omni converter unit.

IOWA'S DIRECTOR of Aeronautics, Ned Locke, makes a weekly commuting flight between Des Moines and Chicago to appear as Captain Hartz of the NBC-TV network's Sunday "Captain Hartz and his Pets" program. Locke began his broadcasting career with an aviation commentary program on Station WHO in Des Moines.

DURING INSTRUMENT FLIGHT today's airliners require a reserved block of air space almost 30 miles long.

COMPLETE X-RAY CHECKUPS for aircraft are being offered customers of Lockheed Aircraft Service, Inc., at Burbank, Calif. Shown here is Bob Reyn-

olds, Lockheed technician, using the Danish-developed x-ray unit to study the wing attach fitting in the center section of an executive ship belonging to

(Continued on page 14)

COMING RIGHT UP

FOR BUSINESS AIRCRAFT

The right heater—the right accessories—the right system for *your* business aircraft:

Pick it from Janitrol's complete line, the heater line that is organized . . . thought out . . . engineered to create combinations of heating units, components, and accessories for dependable systems in all types of business aircraft—from the smallest to the largest. Performance proved since 1942. Duplicates of these heaters, or their counterparts, have totalled millions of operational hours in civil, commercial, and military aircraft of all sizes all over the world.

Output of from 25,000 to 200,000 Btu/hr in single units—to more than a million Btu/hr in multiple units.

Compact, simple, interchangeable, easy to install—check with your local modification center or your nearest Janitrol office.

Backed by 50 years of experience in combustion engineering

New 58-page catalog—for business aircraft owners and modification centers—showing all Janitrol models, accessories, components—installation tips, and engineering data. Your signature on your letterhead brings it.

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AIRCRAFT-AUTOMOTIVE DIVISION
SURFACE COMBUSTION CORPORATION
Columbus 16, Ohio

District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Philadelphia, Penna., 401 No. Broad St.; Kansas City, Mo., 2201 Grand Ave.; Fort Worth, 2509 Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave.

The NEW

Scott OXYGEN CONSOLE

for business aircraft!

FOR

Aero-Commander
Apache
Bonanza
Twin-Bonanza
Cessna
Navion
Twin Navion
Tri-Pacer, others

Only 7½x8x1½" 3 lbs.

● Busy executives realize that higher altitude flying is the "order of the day." Modern engines and navigational aids are designed for that purpose. That calls for oxygen facilities! Above the weather, you can fly faster, safer, more comfortably and get there refreshed, ready to work — with less "flight fatigue." The new Scott OXYGEN CONSOLE for business aircraft provides all these benefits for the lowest cost. It provides amazing compactness, light weight, safety and attractive appearance. Simple to use: Just set at cruising altitude and plug in as many masks as needed. Each outlet is an ON - OFF valve.

See it TODAY at your nearest Scott Distributor:

Air Associates, Inc.
Atlanta
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Dallas
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Denver
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General Aircraft Supply Corp.
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General Aviation Supply Co.
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Oklahoma City
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Standard Products, Inc.
Wichita
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Teterboro
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San Antonio

Also available at other Scott dealers and distributors . . . or write for complete information. Give make of aircraft.

Typical 4-place installation

Scott OXYGEN CONSOLE	$149.50
Masks, tubing, connections and oxygen cylinder	111.00
Average labor cost	50.00
TOTAL	$310.50

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SCOTT AVIATION CORP.

224 Erie Street, Lancaster, New York, U. S. A

Export: Southern Oxygen Co., 15 W. 57th St., New York 19, N. Y.

Briefings . . .

(Continued from page 12)

Superior Oil. The mobile unit probes interior structures to disclose sheared rivets, corrosion, fatigue cracks, buckled ribs and other weaknesses not discernible by visual examination.

THE LONELY SKY is the personal story of one of America's most active test pilot's, Bill Bridgemen. And it's also the story of an experimental, high-speed airplane—the Douglas *Skyrocket*. To simplify the welter of technical detail surrounding test flights, Bridgeman had the help of a non-flying writer, Jacqueline Hazard. The result is a book more exciting than a novel. Published by Henry Holt and Company. Price $3.95.

KEY COLONY, motel resort at Marathon in the Florida Keys with a 7,000-foot adjoining runway, has been purchased from Phil Sadowski by the Jack Tar Hotel chain. All guest rooms have been completely air conditioned and a re-decoration program is underway.

A CANADIAN firm, Computing Devices of Canada, Ltd., has developed a "Position and Homing Indicator" which enables a pilot, by merely pressing a button, to find out immediately how far he is from an airport and in what direction he should fly. The device is independent of radio, unaffected by atmospheric conditions, and immune to enemy jamming. It is being tested by the RCAF, USAF and RAF.

TAKING PART in the atomic tests at Yucca Flats, Nev., these two Model 47H-1 Bell helicopters carry the Civil

Defense emblem. One was assigned to Federal Civil Defense Director Val Peterson and the other was made available to key CD workers and press covering the exercises.

THE SPECTACULAR air photography in the VistaVision film "Strategic Air Command" was done by Paul Mantz in a B-36. His own B-25 camera plane couldn't do the job—it takes a B-36 to keep pace with a B-36.

THE NAVY GETS A "FLYING LST"

NOW THE NAVY can "put it there" on distant beaches in *hours* instead of weeks. With Convair's R3Y, planning charts spring to life overnight.

The R3Y *Tradewind* has globe-roaming range, turboprop speed, and boxcar capacity – and the seven seas are its landing fields. World's first water-based transport with land-based performance – the R3Y is another dramatic result of

Engineering to the Nth power **CONVAIR**

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For the Air Force

Cessna T-37

FOR THE BUSINESSMAN...

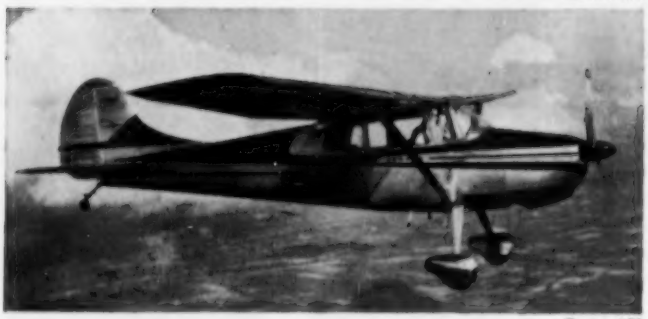
Transportation that's

Immediate transportation that takes you where you want to go, returns you straight home. You set your own schedules. Gives flexibility to your business. Your best men can be more places "in person."

Prestige transportation that reflects successful business operation, modern thinking. Creates favorable impressions among your customers and prospects. Adds importance, increases stature of your personnel.

Economical transportation that cuts traveling costs, adds profitable man-hours to your operation. And, it's easy for you to learn to fly, or there are many fully qualified pilots available.

Cessna 180



Cessna 170

All-Metal Cessna 170

Built like the airliners. Has riveted-seam all-metal fuselage. Only all-metal airplane in the low-priced field. Has 100 "plus" features not found on other low-priced planes. $8,295 f.o.b. Wichita.

Powerful Cessna 180

Nowhere else can you buy over 150 m.p.h. cruising speed, amazing cabin quietness, comfort, luxury, smoothness of this 4-place airplane at anywhere near the same price. Only $12,950 f.o.b. Wichita.

a new Cessna Twin Jet

To meet demands of the jet age, the Air Force awarded Cessna the responsibility of developing a jet trainer which will make the move into turbojet-powered airplanes easier.

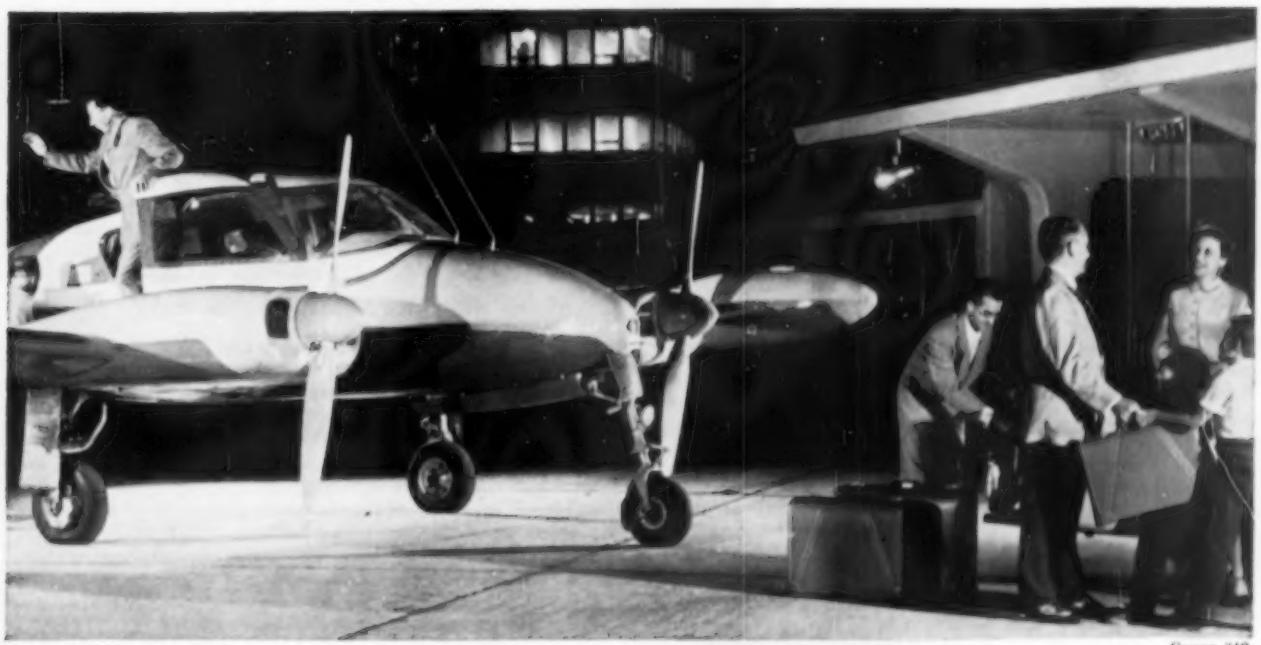
The Cessna-developed T-37 is designed for this specific job. It will fly at both high and low speeds, has outstanding altitude performance, permits smoother, safer transition to jet flying at an earlier phase in a cadet-pilot's training program. This, in turn, means substantial savings in time and training costs for the Air Force.

Given the responsibility of developing this new trainer, Cessna is proud and privileged to join with the Air Force in planning for the jet age.

ready when you are!

For more information about the 1955 Cessnas, see your nearest Cessna dealer (listed in yellow pages of phone book) or write CESSNA AIRCRAFT CO., DEPT. F-6, Wichita, Kansas.

A Cessna for every size and type of business



Cessna 310

All-New Cessna 310

Fastest of the new twins. Wing-tip tanks hold gas load. Retractable landing gear. Can climb—fully loaded—380 ft. a minute on one engine, travel 1,640 miles in a day.* Priced surprisingly low—$49,950 f.o.b. Wichita.

*8-hour day

Cessna

FLYING
VOLUME 57, NO. 1
JULY, 1955

AN EDITORIAL

The Ship of State Is an Aircraft

PEACE on earth depends on power in the heavens. The air ocean is the theater of decision. Freedom defends in the sun and strikes from the cloud. The Ship of State is an aircraft.

On July 11, 1955, the United States Air Force Academy will open its doors to the future. Three hundred young men, competitively selected from 6,000 aspirants, will muster in as cadets at Lowry Air Force Base, Denver, Colorado, temporary home of the Academy.

From the Academy ultimately will come a major proportion of the leaders whose degree of vision and insight will determine the character of military aviation—the American instrument of foreign policy.

Little has been made historically of the intellectual heritage of the Air Force. Few students of national affairs have paused to point out that, between the great wars when politics, education, family life and other basic expressions of society were floundering, the American airman was thinking straight. Battling intrenched dogma within and facing public apathy without, he still produced doctrine and policy which, when tested, saved civilization from the unholy "isms."

Further testimony to the mental integrity of the Air Force can be found in the postwar establishment of the Air University which, responsible for service philosophy, has piloted airpower through the past ten years of transition in weapons, without brittleness or cloying chauvinism. Great educators such as Father Cavanaugh of Notre Dame, Dr. Adams of the American Council on Education, Dr. Miller of Northwestern, and scores of their confréres will bear me out that the Air University practices self-criticism with almost religious zeal.

Additionally, we must note that the Air Force provides for an annual leaven in thinking by the input of young men from the Air Force Officers Reserve Training Corps, fresh from 180 college campuses patterned throughout the nation.

The sum total of this evidence justifies confidence that the Air Force Academy will be something more than "an old school tie" representing the service in athletic headlines and in the palpitating hearts of sweet young things.

But what of the boys themselves—and the faculty?

We have studied the school curriculum and sequence of cadet training. It glows with educational excellence. Cadets who survive its rigors will have balance in knowledge, honor and devotion equal with the proud heritages of West Point and Annapolis.

Beyond this high attainment however, lies a stern if subtle challenge for which there is no text book—a challenge so penetrating that the hearts of old airmen must go out in sympathy to the youngsters who face it.

For the first time in human history we are asking youth to train for leadership in a service which has inherited the absolute weapon—the nuclear system and the power to exercise it. From responsibility of decision in such matters, even our statesmen and legislators have drawn back in consternation.

It may be argued that the nuclear-armed Air Force is merely the instrument of the civilian will of the nation. And that is true. But it is also true that when the life of the land is at stake, the civilian must depend upon military counsel.

There is no escaping the fact that upon the new Air Force Academy will rest a grave responsibility. How does one go about preparing youth for prudent exercise of the power of life and death over civilization? What array of military airpower among free people will checkmate aggression? How can a weapons system be so devised as to exercise practical world discipline without devastation of society itself?

As the twig is bent, so inclines the tree. Certainly as cadets, ipso facto, the young men have no answers to fate out of hand. But as young men they will be bent toward broad imaginative thinking and concept of world magnitude, or toward narrowness and brittleness too ponderous to be of service in steering the Ship of State. The Academy will justify or deny the wisdom of its founding on the basis of that equation.

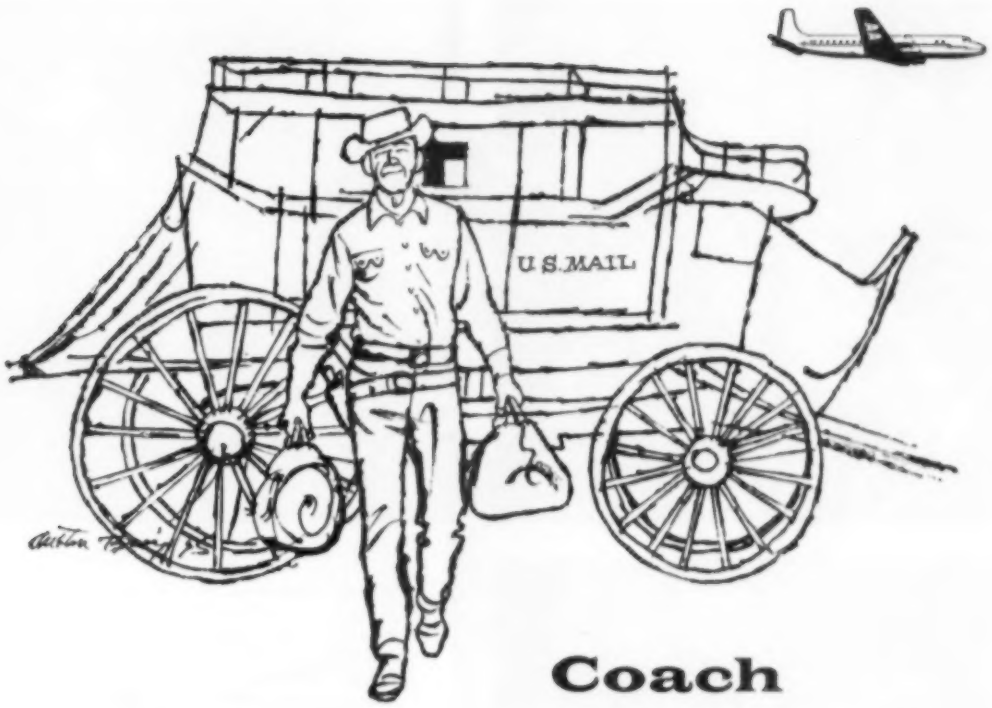
Amidst their martial surroundings, faculty and cadet alike must face the fact that there is no such thing as airpower in the exclusive military sense. The true nature of airpower encompasses all that is nationally potential in the air ocean—civil, corporate and personal as well as military. Strategy and tactics isolated from the context of the air ocean concept are meaningless.

Lead time in creative imagination; perspective; deep sympathy with civilization in its problems; high devotion to the flag; superb skill in mastering techniques of flight—was ever so much required of young men in any mould?

Is there a key? Certainly. He who dedicates his life to a great ideal, himself becomes great!

Gill Robb Wilson

Gill Robb Wilson
Editor and Publisher



Coach has come a long way especially

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. . . and you can go a long, long way for very little on American's thrifty Aircoach service! It's the finest, most comfortable Aircoach service available—because only American Airlines uses big, fast DC-6's exclusively. What's more, you can travel American Airlines Aircoach now and pay for your ticket later. Just ask for American's wonderful "Go Now—Pay Later" Plan.

Typical Fares: CHICAGO-MEXICO CITY $76.00
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ALL FARES PLUS TAX

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America's Leading Airline

1

2

1

Normal presentation of a typical line squall on the radarscope of a Plane Position Indicator. Concentric circles are range markers representing ten-mile intervals to a maximum of 50 miles. Apex at bottom of 'scope represents the airplane's position and dead ahead of the airplane is "straight up" on the 'scope. Lighted areas represent rainfall but note that there is no indication of the location of turbulent areas.

2

The same Plane Position Indicator with the Contour switch turned "on." The exact range and bearing to the thunderstorm cores becomes immediately apparent. Degree of turbulence is determined by a study of the thickness of the lighted and dark areas surrounding the contour "holes". The thinner these areas, the greater the turbulence.

3

3

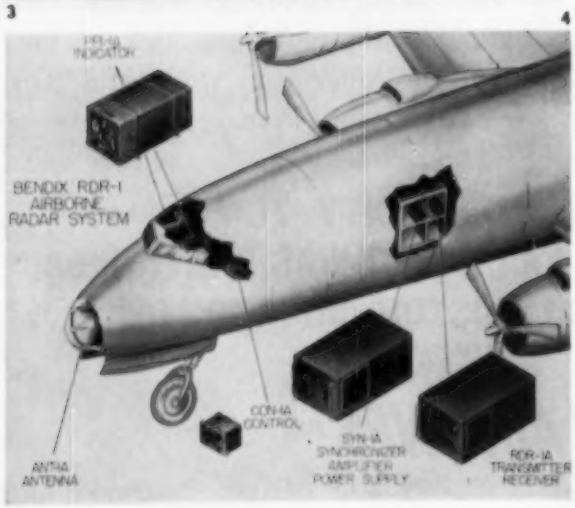
Radar Indicator in DC-3 mounted on universal joint for use by either pilot, co-pilot or observer. Hood is necessary when viewing Indicator under high ambient light conditions.

4

Installation of Radar Components in a typical airplane.

5

Although DC-3 looks odd when radome replaces regular nose, aerodynamic characteristics are not affected.



4

5

Sequence from left to right shows the approach of a thunderstorm from its initial detection at a range of 35 miles for a period of twenty minutes. Note the shape and constant changing of the "cores". At night or on instruments, it would be dangerously easy to fly into the center of this storm without the help of radar.

AIRBORNE RADAR

By adjusting the Tilt Control, located in the cockpit, the radar beam may be tilted down for ground mapping. Coastlines, rivers, cities and mountains make excellent radar targets as this graphic picture shows.

For thunderstorm penetration and avoidance of areas of high turbulence, weather radar provides the answer.

By RICHARD S. FINKE

CLIPPER 6531C is a marked airplane these days. It is the first regularly scheduled commercial airliner to fly the North Atlantic with its own radar for storm turbulence detection. Pan-American's 31 Charlie is a tourist class DC-6B flying the routes from New York to London, Paris, and, occasionally, Johannesburg, South Africa.

The radar, built by Bendix, is known as the RDR-1 Airborne Radar System. The RDR-1 is the first to be designed and produced solely for commercial aviation—its specifications in accordance with the requirements of a joint airline technical committee known as Aeronautical Radio, Incorporated (Arinc). Other airlines, Panagra, Northwest, and Braniff are evaluating the radar today and all new aircraft specifications require radar, or that provisions for radar be available.

In June, 1953, United Airlines conducted an evaluation to determine the usefulness of airborne radar for airline operations. This investigation concluded that the availability of a radar on a commercial airliner, while contributing greatly to flight safety, was also justified by considerations of economy. The UAL investigators found that operational delays could be reduced by making storm detours or penetrations in such a manner as to increase scheduled flight time by a very small amount. As a result of these tests, United is equipping its entire fleet.

Although Bendix is optimistic for the future of its latest product, look at some of the comments made by airline pilots who have flown with the radar in thunderstorm weather.

"Excellent—in ten years, no airliner will be without a device of this sort."

"I feel I can fly through a front without turning on the seat belt sign."

"We flew through this front with barely a ripple while other flights in the same area were reporting up to 45 minutes of severe turbulence."

"Airborne radar is another real contribution toward the goal of safe, comfortable, all-weather flight."

A radar consists of five major components: the Antenna Scanner mounts in the nose of the airplane, so the conventional metallic nose is replaced by a transparent material known as the radome. The antenna is stabilized for roll and pitch of the airplane. (*Continued on page 58*)

Far right: Aerial view of the landing strip at Rancho Buena Vista as we approached over the water. Right: Food for hungry pilots is served family style.

Far right: Rancho Buena Vista lounge. Owner Herb Tansey appears in the foreground wearing striped shirt. Right: Typical village in Baja California.

Looking for wonderful fishing,

good flying weather, effervescent hospitality?

Then fly to Baja California and find a

PILOT'S PARADISE

By ERIC STORM

TAKE ONE lightplane.

Add a pilot of average competency. Mix in the sum of 40 odd dollars for gas, oil and visas, and you find yourself with the basic elements of a perfect international vacation.

For many years I have argued the merits of the lightplane, as a vacation vehicle. On scores of fishing trips I have utilized the lightplane to facilitate my jaunts. But for me this year has become the year of the Great Proof.

I have found a land, foreign, yet near enough, that seems to have been designed specifically for the lightplane traveler. Where California ends, just south of San Diego, you find a 1,300 mile extension of peninsula. The maps label it Baja California. (Pronounce it BA-HA.)

This is Mexico!

This is a land at once beautiful and desolate; a land of craggy mountains and abrupt, red-topped mesas; a place where the sun has drenched the soil and drained the natives of all but tranquillity and peace. And, I like to think, this is the land the Wright Brothers had in mind when they gave us the airplane. For here, the *Cub* and the *Apache;* the Aero *Commander* and the Aeronca alike will find a common ground of safety and pleasure.

We tried it. Rumors of the terrific marlin fishing and the sheer contentment one could find in this jutting thumb of Mexico had long intrigued us. We were somewhat skeptical of finding smooth fields and safe emergency areas. But we tried it. The result? Note the title of this piece, please.

You start at San Diego, point the nose of your airplane south, and ten minutes later, you will be landing in front of the customs office at Tijuana.

This border town is only 17 (*Continued on page* 74)

Opposite page: This marlin catch made the whole flight seem like the epitome of vacation trips.

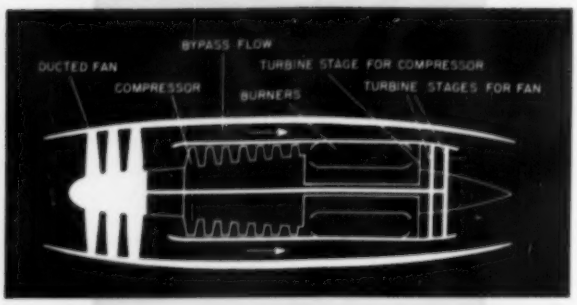


FIG. 1

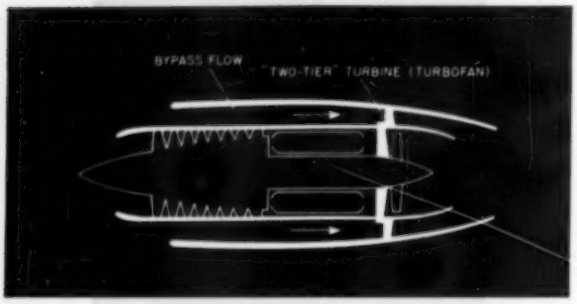


FIG. 2

THE BYPASS ENGINE

Thrust unlimited—with a hush.

By THOMAS F. DARGE

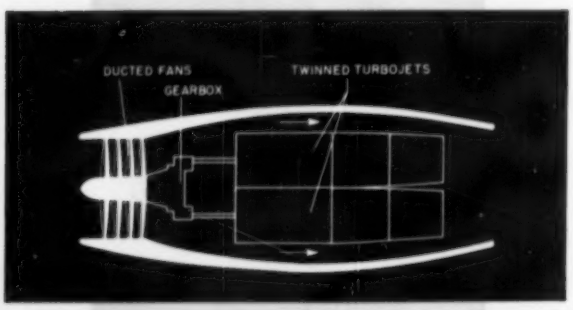


FIG. 3

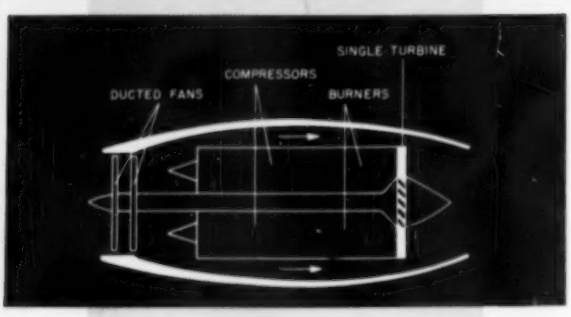


FIG. 4

SOMEWHERE, THERE'S A NEW type of jet engine straining against the shackles of the test bench. It's not particularly impressive to look at; compressors, burners and turbine are all shrouded in a fattish shell, like a slim girl in a bulky topcoat. Neither does it give with that lusty 170 decibel howl you've come to expect from a jet. Just a few feet from the tailpipe, the noise is quite bearable, even without a protective helmet. It's the gauges that tell the dramatic story: 15,000 of static thrust; specific fuel consumption: .30 lb. of fuel per lb. of static thrust, per hour.

Its name is the bypass engine; its future seems unlimited.

Barring some completely unsuspected breakthrough in the atomic power field, the bypass will power the airliners of the sixties; it will probably push most of the remaining manned warplanes through the sky; and there may well be some small ones specifically designed for 400 mph private planes.

To understand the potential of the bypass engine, one has to start with the humbling admission that the pure jet, spectacular though it is, is no world-beater when it comes to efficiency. Find out why it is inefficient, and you've taken the first step toward inventing the bypass.

The low propulsive efficiency of the jet engine is in part due to the fact that the jet exhaust stream is traveling several times faster than the plane itself. Thus, instead of being converted into thrust horsepower, much of the energy is left behind in the form of kinetic energy. Ordinary devices to boost engine efficiency become self-defeating when applied to a jet turbine; thus, if you raise the operating temperature, hoping to raise thermodynamic efficiency, you are also bound to increase the jet velocity—and be right back at the starting gate again.

What then is a prescription for a better jet engine? a) Slow the jet velocity: (b) Cool it: (c) Spread the engine energy over a larger mass of air.

If solution "c" looks familiar, it's because it represents the *raison d'être* of the turbo-prop; but we all know that until now at least, compressibility troubles have kept propellers out of the picture for speeds considerably in excess of 500 mph.

And here's where the bypass comes in.

Picture a large metal sleeve enclosing a straight jet engine; at the intake is a set of fan-like blades, driven by one or more stages of the turbine farther back by a shaft running inside the compressor driveshaft. This ducted fan, ahead of the engine proper, feeds some of the incoming air to the compressor (in this sense, it acts somewhat like the low pressure stage of a two-spool turbo-jet) and pushes the remainder around the body of the engine, into the turbine exhaust stream (Fig. 1). There, the mass of cold air slows the jet stream to where it is no longer a multiple of the airplane speed, and cools it at the same time.

How much fuel this device can save is demonstrated by its use in an early French jet engine. Turbomeca, well known as the manufacturers of an impressive line of ultra-small jets, brought out a small bypass in late 1950. Designated the *Aspin*, this lightplane engine delivered a static consumption of only .6 lb. fuel /hr/lb. thrust. Now in these tiny jets a fuel consumption of twice that figure is considered quite acceptable; apply these figures to large units such as the J-73, and we can look for piston-engine fuel consumption in the jet age.

The principle of the bypass engine can have endless variations and applications. A different type from the one described has the cold air fan blades forged on top of the turbine blades instead of ahead of the main engine (fig. 2). The British firm of Metrovick produced the first—and to date the only engine of this type. It appears that production problems of this "two-tiered" turbine are almost insurmountable.

Coupled jet engines inside a single large bypass unit are a logical next step. Both engines could be geared to drive several stages of coaxial ducted fans filling a large circular intake located between them.

The fans would merely take up the waste space between the engines in side-by-side turbo-jets (fig. 3). Such an installation would have a great deal in common with twinned turbo-props such as the Allison units on the *Tradewind* flying boats.

A variation of this theme was suggested by Whittle himself; one of his patents calls for the twinned installations to drive a large turbine located between them, which in turn would swing the ducted fans ahead of the main engines via a long driveshaft (fig. 4).

And still we've only scratched the surface. The bypass engine-afterburner combination will enable flight for long periods with the afterburners in operation, instead of in short squirts as is now the practice. Afterburners now soak up fuel by the bucketful because they must almost double the temperature of the already fiery exhaust stream to achieve the 40 per cent thrust augmentation which is their current limit. Obviously much less fuel will be required to double the temperature of the coolish jet stream from a bypass engine for identical results. Moreover, the 40 per cent thrust limitation no longer applies, since it is based on the oxygen content remaining in the jet stream, whereas the bypass flow contributes large masses of unburned oxygen.

The bypass-afterburner com- (*Continued on page 54*)

Type 37 Russian bomber appears to have four bypass engines.

The British Vickers 1,000, with four Rolls-Royce *Conway* bypass turbo-jets.

Wanted: A reasonably priced

lightplane with excellent performance.

FOUND:

A $1500 FLIVVER

By TED DUROSKO

FOR $1,500 WE HAVE a two-place flivver that cruises at 85 mph, has a 300-mile range, jumps off the ground in approximately 150 feet with full load, climbs 900 fpm, handles solidly at sea-level or 12,000 feet, is covered with fresh Irish linen, and has a distinctive paint job. Inside it has foam rubber cushions, a soft-toned two-color interior which is restful under a green tinted extra large skylight, and on the panel are the primary rate instruments with which to take her through a low visibility area.

From whom did we buy the ship? What is the name of the craft? Well, we didn't exactly buy it as such—we somewhat created it. And in name I guess you would still call it a Piper—however, followed by the words "Flivver Special". To explain how it evolved, I had better start at the beginning of the story.

The project began about three months ago one Sunday afternoon while sitting around the coke machine at Jim Ottney's Mid-City Airport, Hudson, Ohio. A friend, Joe Eiben, and I decided it would be nice to have a flivver ship which could get in and out of the various small strips located on the islands in the northwestern part of Lake Erie where the fishing is excellent, also a plane to wheel out of the hangar on week-ends to make short hop visits and a small ship to fly when you have that urge to get up close to the clouds on a summer evening.

The idea appealed more and more to us as we talked. The flivver should be practical, we agreed, and should have the following specifications:

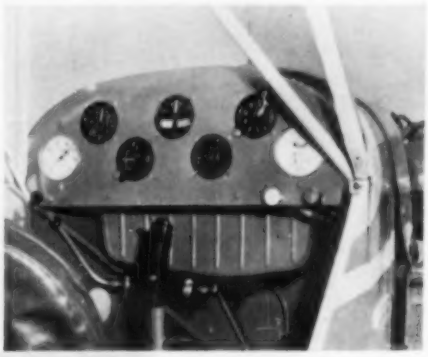
1. Be two-placed.
2. Have exceptional take-off and climb performance with full load since we would be using short sod strips.
3. Have a cruise of at least 80 mph.
4. Carry enough fuel for approximately 4 hours, allowing operation in areas where fuel service is limited.
5. Be equipped with a radio receiver and a primary panel to allow going through thick industrial smoke areas and out over water where sometimes the haze blends the sky and water into one.
6. A good glide ratio in the event of a power failure over water.
7. And, most of all, be reasonable in price.

With such points in mind, we began to look over the market. After reviewing tons of literature on American and European made planes, we arrived at the same conclusion which so many other prospective flivver buyers had made—there just isn't a low-priced flivver.

Our hopes for an inexpensive runabout were fading rapidly—until we got the impulse to improvise one for our particular needs. It would be just a matter of an engineering review of existing lightplanes to see what modifications were permissible. We planned to make modifications which would not place the ship in an experimental classification and yet give us the desired performance. Our interest and hopes swung the other way as we set about our task.

For the start, we chose a Piper J-3 *Cub*, as we felt this airplane possessed the basic specifications we desired. We bought a rundown 1947 metal spar wing *Cub* for $400 and disassembled it. All the old fabric was removed, the metal work sanded, welds checked, and then zinc chromate was applied to retard any future rusting action.

Meanwhile, we contacted Rentz and Rufi Aircraft Repairs at Mid-City Airport to talk over our plans for the rebuilding. They quoted a fair price which permitted Joe and me to do some of the non-technical work under their supervision. As soon as room was available in the shop, we moved in the airframe and (*Continued on page* 62)



The author's "Flivver Special" which cruises 85 mph with full load and takes off in 150 feet. Above: On the panel (left to right) are cabin heater, mixture control, and engine primer. Wing tank line leading down from the left feeds into nose tank through control valve seen at left of stick. Radio receiver is mounted overhead to be accessible from front or back seat.

For the first time in flying history, a way has been found to stabilize stalls by use of an

AUTOMATIC STALL CONTROL

By Cornell Aeronautical Laboratory Staff Writers

H. S. TOLLEY and R. S. BALME

Research plane in level flight . . .

. . . approaching the stall . . .

. . . in the stall and under automatic control.

STALLS in flight, nemesis of the pilot since the Wright Brothers and cause of a large number of airplane accidents, have been automatically controlled for the first time in aviation history.

The Cornell Aeronautical Laboratory has disclosed that adjustments made in automatic pilots have eliminated the violent "roll off" at the stall, and permitted an automatically-controlled stalled glide. The airplane used in research for the U. S. Air Force was a single engine Fairchild PT-26, a low wing primary trainer.

Engineers said the stabilizing equipment proved successful enough to be found applicable to tactical airplanes. The Sperry autopilot, which was modified to deal with stalled flight, is found in many conventional aircraft.

Several practical applications of stabilized stalled flight may occur to the imaginative engineer. Turning and landing maneuvers, presently impossible, may some day be flown by airplanes designed to use the resources of a stabilized stall. In fact, stabilized stalled flight may be useful when it is desired to: (a) prevent loss of control in an inadvertent stall; (b) use maximum lifting potentialities of an airplane; (c) perform rapid descents without picking up excessive speed; (d) obtain high drag at low speeds, as in minimizing the landing roll of an airplane and thus permitting use of shorter landing areas.

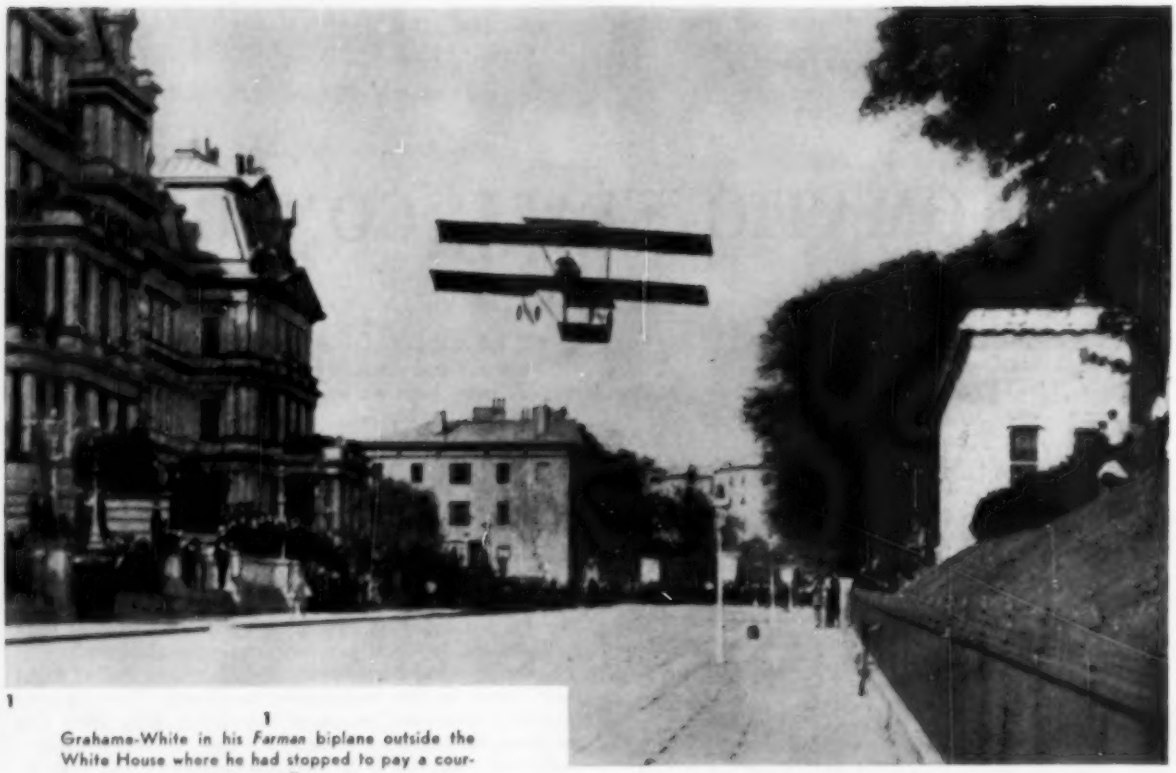
Results of the find could be far-reaching in aviation, although Cornell engineers are the first to point out that further research is necessary before any practical application is feasible.

But exactly what is a stall? Stalls result from a fundamental characteristic of any airplane wing. As an airplane is flown slowly, the angle at which the wing meets the air (angle of attack) must be increased. Unfortunately, above some critical angle the air ceases to fly smoothly over the wing and breaks away from the surface in eddies.

When the stall occurs, the lift on the wing decreases sharply and the airplane starts to drop. The drag becomes high and the power required to make the airplane fly level becomes large. Even worse, the airplane becomes highly unstable and the effectiveness of controls becomes small.

This combination makes the airplane essentially uncontrollable and it usually rolls off to one side or the other and enters a spin. Normal flight can be regained by pushing the nose down to decrease the angle of attack below the stalling angle. If the airplane is high enough, this is perfectly feasible, but if it is low—on takeoff or landing for instance—the ground gets in the way.

Cornell research on stalled flight started more than six years ago. The CAL project was believed to be the first serious investigation of the motion of a stalled airplane since the pioneering work done by the British in the 1920's and '30's. Cornell's work has been supported by the Air Research and Development Command of the Air Force. The Fairchild PT-26 was selected as the test airplane because it had a representative modern shape; a wind tunnel model existed; and it was (*Continued on page* 48)



1

1
Grahame-White in his *Farman* biplane outside the White House where he had stopped to pay a courtesy call.

2
The author, who has written many aviation books.

3
Salvaging Latham's *Antoinette* monoplane, downed in Channel on attempted flight France to England.

4
Kuller, a pioneer pilot, escaped with minor injuries after his *Antoinette* monoplane crashed into trees.

5
World's first night flight was made by Grahame-White in famous London-Manchester contest of 1910.

6
First aeroplane to fly in a gale of wind. Herbert Latham flies his *Antoinette* monoplane at Blackpool in 1909. Note trees bending over in strong gusts.

7
First man to learn to balance himself in gliding flight, Otto Lilienthal, suffers fatal crash.

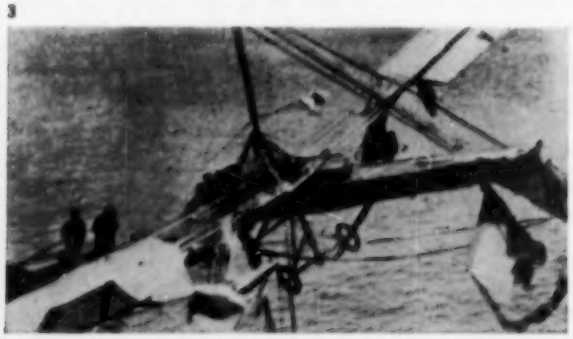
8
In 1910, Grahame-White won Gordon Bennett speed contest at the incredible speed of 60 mph but turned over on a landing the next day. He escaped unhurt.

9
Robert Loraine's *Farman* biplane after being salvaged from sea just off the Irish coast in an unsuccessful attempt to fly from England to Ireland.

2

I Was

3



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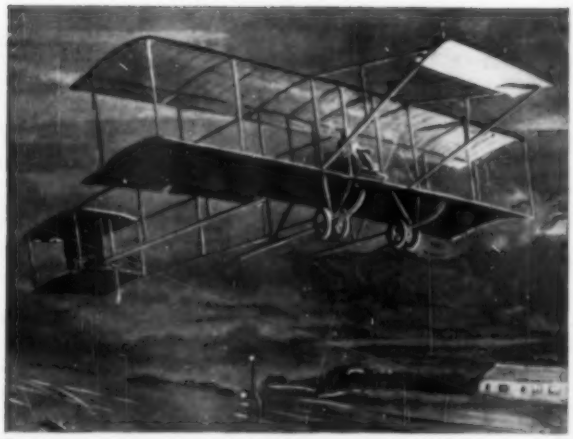

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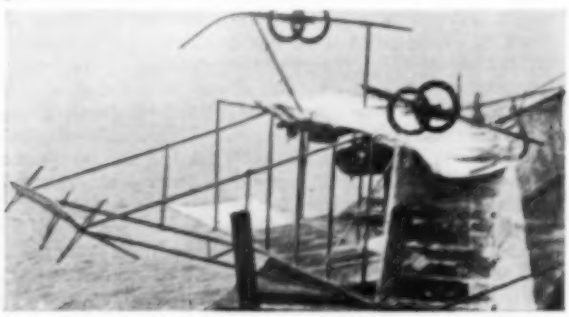
Their Scribe

The first air reporter,
himself a pioneer airman,
reminisces
on the early days of flight.

By HARRY HARPER

9



DANGLING FROM A ROPE beneath a giant runaway kite, outriding a gale in a free balloon, or diving out of control in a pioneer airship—I have had my moments. I was the first air reporter.

Away back when Wilbur and Orville Wright—both friends of mine—were building the first of their powered gliders, I too was busy in my workshop with gliding machines and manlifting kites.

On one occasion, a kite of mine developed a sudden lift in a strong wind and whisked me off the ground while clinging to a rope. Up I was whirled before I could let loose, high into the air. Later and lower when I dropped from the rope, I fell into thick foliage which broke the

shock of my fall, and I lived to see another day.

Another time in a free balloon I went with two well-known aeronauts, Bucknall and Pollock, to try for a new record by drifting across Europe to Siberia or Mongolia. As it turned out, we were eventually flung to earth in a gale and I was pinned down by the neck under the rim of our heavy basket, and almost smothered to death with sand-ballast. At the last moment, Bucknall and Pollack got me pried loose.

Luck was better in a pioneer airship in which I rode with its pilot and engineer. A sudden thermal threw us into a dive. We were all on a small open platform slung beneath the hull, and when the machine put its nose down, I slid forward and clung for dear life to a side-rail. Right beneath us was a big wood. I was beginning to steel myself for the headlong crash when, with a jerk that threw me back on the platform, the ship righted itself suddenly and shot just over the trees. Odd reactions one has at moments like that. All three of us burst out laughing.

It was only the other day that someone asked me who

Louis Bleriot, who risked death when making the first aeroplane flight from France to England. Below: Hobbling to his plane on crutches, having burned a foot just previously in petrol fire.

was the bravest among the early flying men? After a moment's thought, I answered—Louis Bleriot!

Why? Crashing time after time in experimental machines, and often escaping with his life by a miracle, Bleriot resolved to be the first man in the world to fly the 21 miles of sea between France and England.

At that time he had a little monoplane driven by a three-cylinder, air-cooled engine developing about 25 horsepower. This motor never had run previously for more than 20 minutes without overheating. To fly the Channel from Calais to Dover, Bleriot knew he must be in the air at least a half hour. If he fell into the water, the machine would sink long before help could reach him.

The morning Bleriot started on this perilous flight I was perched on the roof of the old Channel Tunnel building on the cliffs near Calais, describing what was taking place through a portable telephone connected with a wireless installation in a room beneath. These news flashes of mine were wirelessed across to Dover and then telephoned to newspaper offices in London. Although I did not realize it then, I was making the first of all outdoor broadcasts.

A few days earlier Bleriot had burned his foot in a petrol fire, and had to hobble with crutches to get into his monoplane. When someone expressed sympathy with him, Louis replied grimly, "If I can't walk, I'll surely show you I can fly."

Show us he did, vanishing in the haze on his way towards mid-Channel. When he was about halfway across, with not a single vessel in sight on the water beneath, the little motor began to run hot and lost power rapidly. Bleriot sank nearer and nearer to the Channel chops. Then, just as he was beginning to give up as lost, a rain-squall swept suddenly up the Channel. This cooled the over-heated cylinders. The engine picked up power again and Bleriot flew on, snatched by Providence from what would certainly have been his watery grave.

Bleriot's rival for cross-Channel honors was a bored, rather weary-looking young man who never seemed to come to life until he was at the controls of an aeroplane. Then he flew with reckless daring. Hubert Latham was his name, and he always piloted a big, wide-winged *Antoinette* monoplane. Actually he had made an attempt to cross the Channel before Bleriot but his motor failed and he came down in the sea. Raising his feet out of the water, as his machine was sinking, he was coolly smoking a cigarette when a French torpedo-boat dashed up in the nick of time to rescue him.

Another time Latham's motor "seized" suddenly and tore itself out of the plane in mid-air. He got the engineless machine down without injury to himself. Yet again he crashed onto the roof of a shed. In the end, it was not flying that killed Latham, but a wounded buffalo in the French Congo, where he had gone to hunt big game.

If ever a pilot gambled with his neck, it was young Claude Grahame-White, when he made the world's first night flight. His was a desperate courage which stands out vividly in my mind because I followed that flight in a big American steamcar, driven by a well-known early motorist, Mr. Freddy Coleman.

Grahame-White and the French champion, Louis Paulhan, were rivals to win £10,000 for a first flight from London to Manchester. The British pilot, finding himself behind Paulhan, resolved to make up the lost ground, and simultaneously be the first of all pilots to fly cross-country by night.

With engines far from reliable, and no landing fields or wireless facilities available, the idea seemed so impractical that the airman's friends begged him to abandon it.

"But it's my only chance," argued Grahame-White and, waving objections aside, took off in total darkness from a small field, his only guide for take-off being the light some bicyclists shone along a hedge with their lamps. Clearing the hedge in the darkness by a few feet, he climbed into the night sky, only to hear his motor splutter and stop. Below he could see nothing, and almost gave himself up for lost but the motor caught again and he was able to fly on.

Coleman and I had driven on ahead to shine our headlights on the white-washed wall of an Inn, hoping that this might act as a guide. Grahame-White did see the patch of white in the darkness and came flitting towards us, the exhausts of his revolving *Gnome* motor looking like a ring of fire moving through the night sky.

Swinging our car around, we shot off down a road leading in the right direction, and Grahame-White lined up on us. So, for a time, car and plane raced along together through the darkness. Then the airman caught sight of a freight train on the parallel railway, and turned to follow that. He flew till dawn, when the wind grew so turbulent it made his slow-flying biplane uncontrollable. He had to make the best landing he could, being still some distance behind Paulhan who, (*Continued on page* 68)

LOOK OUT FOR WIND GRADIENTS

or you will be due for an unhappy surprise which may prove very dangerous.

By JOHN BELTER

FOR THE PAST SEVERAL years, my vacations have been spent flying Stearman sprayers for Aerial Blight Control of West Bend, Wis. This led to a thought provoking experience in low altitude flying that came as an abrupt surprise to me.

Each of the three times I was taught to fly—first on my own hook, then in the Civilian Pilot Training Program, and finally in Naval flight training—it was either firmly stated or implied that in upwind versus downwind flight, or in upwind or downwind turns, the only effect on the airplane's flight was an optical illusion caused by wind drift.

This, I find, is not so, at least when flying at low altitudes.

The "optical illusion" viewpoint is based on the idea that the air moves as a "mass" with the wind blowing at the same velocity at ground level as higher aloft. Every meteorologist knows that the geostrophic wind altitude is about 1,000 feet and that, below this level, the air motion is slowed by ground friction. Under ordinary conditions this change in wind velocity is so gradual that the wind gradient would have scant effect on the flight of an airplane. The optical illusion of wind drift on the apparent speed (groundspeed) of an airplane is the only significant effect.

Now consider what would happen to an agricultural airplane climbing sharply and gliding steeply over obstructions at near calm, on the ground, but with wind velocity of 60 mph at 500 feet. Just for the record, the wind gradient described is not theoretical. It actually describes conditions I encountered at sunrise. There was so little wind at the ground that two of us used different runways, yet at 500 feet I was able to remain motionless flying into the wind with a fully loaded Stearman!

To get back to the specific effects of a wind gradient of considerable magnitude. The first effect is the interaction of the aerodynamics of the plane and the wind gradient. Flying downwind lift is decreased, stalling airspeed is increased, and stalling angle of attack is reduced. This is due to the fact that the wing of an airplane carries with it a "wind gradient" of its own, since the air above the wing is moving faster than the air below. This speeding up of air above and slowing down below produces the pressure difference that lifts the plane. This aerodynamic "wind gradient" affects the air to a considerable distance above and below the wing, so the circulation of the wing and the meteorological wind gradient interact. Flying downwind, they tend to cancel one another, so the result is less wing lift. But flying upwind there is a mutual reinforcing and lift is increased.

This aerodynamic effect of a wind gradient has been observed by soaring pilots during ridge soaring flights for many years and I would like to quote from an article in "Soaring" March-April 1942 entitled, "Downwind Turns and Downwind Flight" by Arthur B. Schultz. "Thus, flying upwind in a smooth grad- (*Continued on page 76*)

SUPERSONIC BOOM-

A man-made thunderclap, cutting a drastic swath of destruction equivalent to an 180 mph hurricane, may provide a new method of attack.

By THOMAS F. DARGE

ILLUSTRATED BY ED VALIGURSKY

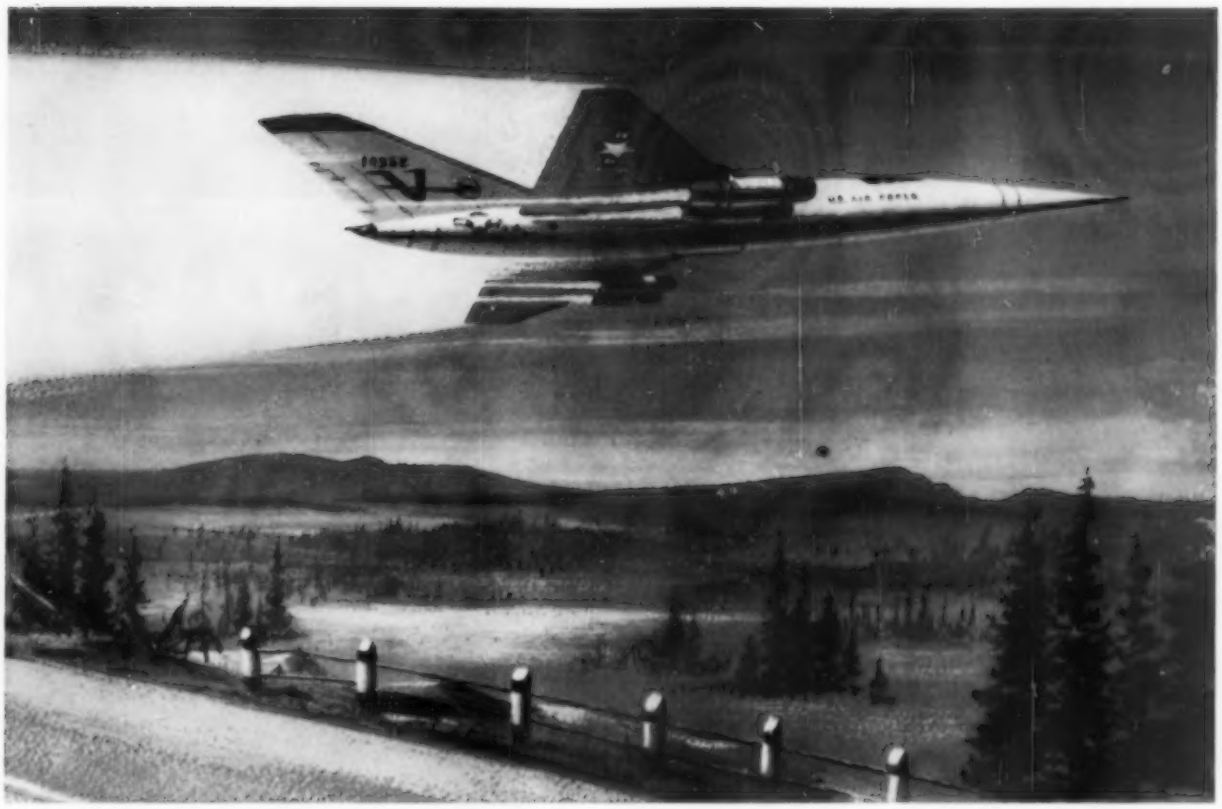
THERE IS A POTENTIAL new weapon in our aerial arsenal. It requires no manufacturing process; it need not be stockpiled for future use, or distributed to combat squadrons in time of war.

In the planes, the device in itself occupies no space and weighs nothing—yet it can come into play whenever the pilot opens wide the throttles or turns on the afterburners.

Its effects are startling, even to military observers whose vocabulary has been enriched in recent years by such terms as tactical A-bomb, megaton and megadeath. Whereas nuclear bombs are designed for *area* annihilation, this weapon inflicts *linear* damage; it affects "soft-skinned" targets within a strip only a few hundred feet in width, but several hundred miles long.

Its name? The supersonic shock wave, alias, The Sonic Boom, or Bang.

Shock waves surround any object traveling at or above the speed of sound. They form the wake-like pattern on the Schlieren photographs taken in our high speed wind tunnels. They account for the ominous "ripples" first noted by World War II fighter pilots when they glanced at the wings of their planes during a power dive. Again, shock waves hurtling against wings and



A NEW WEAPON?

control surfaces brought many attractive prototypes and their pilots to a tragic end at the dawn of the supersonic age.

The introduction of thin, swept-back wings, "all flying" tail surface, and a much greater safety factor in the structure of modern planes has now taken the teeth out of the shock wave effect—for the planes themselves.

However, as far back as 1949, a worried citizen around Wright Field phoned the local police headquarters to report "explosions in the sky." These, it was later revealed, were the F-86 prototypes engaged in supersonic dives at high altitude. The Farnborough Air Show in England, in 1951, was highlighted by a number of supersonic booms which caused great speculation among spectators. Again, shock waves from supersonic flights were responsible.

In attempting to explain the phenomenon, some interesting, if erroneous, theories were produced. The most original one asserted that the sonic boom was simply the aircraft's own noise effects (turbine howl, wind noise, etc.) "stored up" during flight at Mach 1. A letter to a British aircraft magazine argued that a stationary object making a continuous noise could be visualized as a focal point from which concentric circles keep emerging, as from a stone tossed in a pond. If the object is accelerated to Mach 1, or the speed of sound, the argument went on, these circles would become congruent with the moving object, resulting in a single clap of sound to a stationary observer. It was stated that, if an aircraft could manage to fly exactly at the speed of sound for about an hour, the sound thus accumulated would presumably blow the hapless observer off the face of the earth.

Actually, supersonic bangs result from air molecules compressed into the shock waves by the airplane's passage. Below the speed of sound, the airplane is preceded by an envelope of air "warning" these molecules to move out of the way. No such advance notice takes places at or above the speed of sound, and the plane acts like a battering ram instead of easing into a yielding, "willing," mass of air. The compression thus achieved results in shock waves, trailing like infinitely expanding cones from the fuselage, wings and other protuberances.

The British observer was right on one count, however. The supersonic boom can be forged into a weapon.

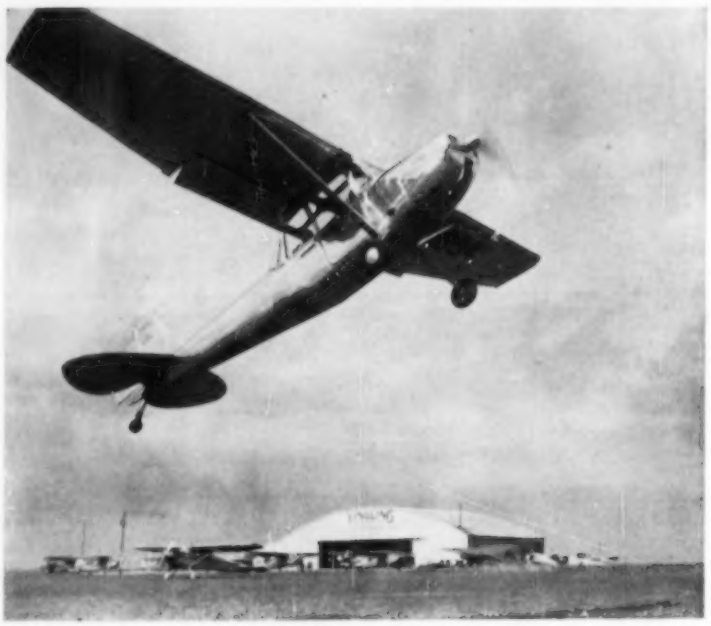
The Germans were first to utilize its destructive potential. When their V-2's were dealing out random destruction during the closing days of the European conflict, it was noted that their radius (*Continued on page 54*)

THE PRO'S NEST

DON'T BE FLIPPANT WITH FLAPS

Do you know the proper flap settings for short take-off, slow cruise, or single-engine emergency?

By JOHN R. HOYT



Cessna 305 uses flaps in short field take-off demonstration.

IT WAS 1:30 P.M. The temperature was in the 90's. Heat boiled in visible waves from the macadam runway as we checked the mags for take-off. At 1:34 we received clearance from the tower.

"Halfway down the runway it became obvious we weren't going to make it. There were trees at the end of the field and it was too late to stop the take-off."

These are, of course, famous last words. Pilot Friday should have studied the effect of high temperature upon the distance required for take-off, and known about the use of flaps. But ask the average pilot what his flaps are for and he'll probably tell you that they are to "land with"—one of those half-truths which is like explaining that the landing gear is something the pilot retracts after take-off.

To be serious and not flippant about this, what flap setting *would* you use for a short take-off? For slow cruise? For emergency (single-engine) operation? What happens if the flaps are raised suddenly?

Flaps, of course, were a device made necessary when we asked for slower landing speeds in our cleaner, faster aircraft. Obviously, just adding drag would not help us. If pure drag were added, the plane would still land—that is, *stall*—at the same speed. We needed additional lift, which was obtained by adding to the trailing edge of the wing a cambered device called a "flap," which could be moved from 0 degrees (flush with the wing) to about 45 degrees downward.

This added considerable lift, but it also added drag. What is more, the drag increased in greater proportion than the lift. With full flaps, the drag increased so much that the nose had to be lowered, or the power increased appreciably, in order to maintain airspeed above the stalling point. But, when the landing was made, the plane landed at a slower speed because the added lift lowered the stalling speed. The speed was dissipated faster because of the greatly increased drag, and the runoff distance was less.

Today, private pilots are flying planes equipped with flaps. Some planes have flaps which can be set in three positions (zero, one-quarter, and full); other planes have flaps that can be set at any desired angle. The principles of flap operation are the same for all planes, but the exact technique of operation varies, and pilots are cautioned to know their plane and to study the aircraft manual before applying the principles.

In our imaginary take-off, Pilot Friday suddenly remembers his flaps. Should he use them, and if so, how

Lockheed *Electra* uses flaps on final approach for a landing.

much? The use of full flaps will balloon him clear of the obstacles, but if he is flying with a full load on a hot day, he will again be in trouble after he clears the obstacles. For at near-stalling speed with full flaps, many airplanes cannot be brought back to climbing speed without first losing altitude!

Maximum lift compared to drag (that is, L/D) occurs, when flaps are used in the average airplane, with about one-quarter flaps, or from 9 to 16 degrees. The added lift enables the plane to take off (or land) at a slower speed, and to leave the runway after a shorter run. Thus, despite the fact that the drag is also greater with flaps, when our imaginary pilot reached down and lowered his flaps about 10 or 11 degrees, the plane left the runway, began climbing, and cleared the obstacles.

Once in the air, he was faced with the problem of raising the flaps. When should he raise them, and how much? A handy rule is this: when a speed of 50 per cent greater than the normal stalling speed is attained, raise the flaps; when the speed is 60 per cent higher, they *must* be raised, because in some aircraft the flaps are not designed or stressed for the loads imposed by high airspeed.

But suppose that Pilot Friday found it urgent to raise the flaps in order to both fly and climb faster? In this case, the very minimum speed for raising the flaps is 20 per cent over the stall. If they are raised sooner, all ability to climb may be lost. Another handy rule is this: flaps may be raised one degree for each mile per hour of airspeed in excess of 20 per cent over the stall. Example: stalling speed is 40 mph, flap setting 12 degrees; at 50 mph raise the flaps 2 degrees, at 55 mph raise the flaps 7 degrees, and at 60 mph raise them completely.

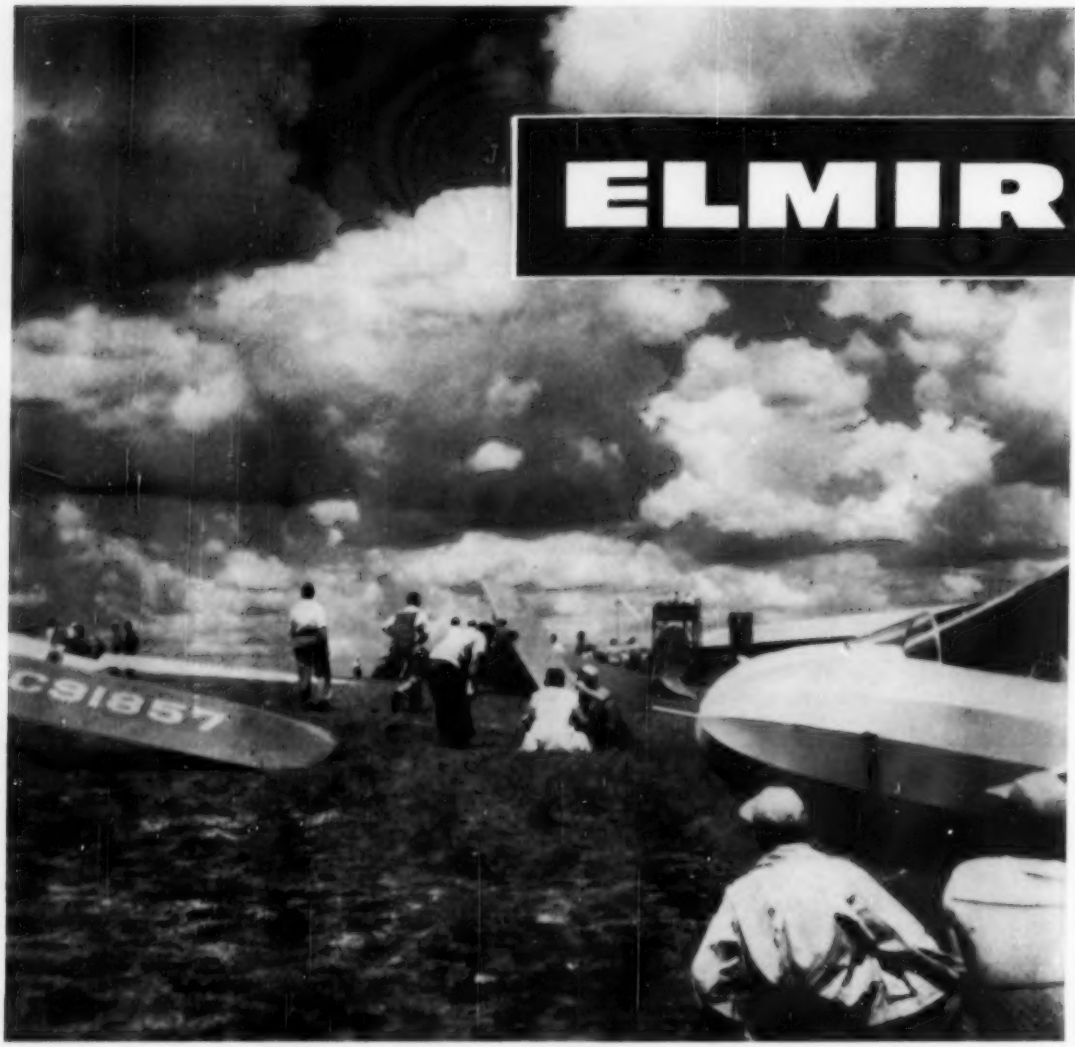
This is a good time to clear up that old wives' tale about always raising the flaps slowly. As the preceding example shows, at 50 per cent over the stall the flaps may be raised immediately, without inching them up one or two degrees at a time; while at any speed less than that, they must *not* be raised quickly. The rule of raising the flaps slowly is good for the novice, but the expert pilot knows his plane and flies accordingly. It should not be necessary to add that, when flaps are raised quickly, the angle of attack must be increased to compensate for the loss of lift when the flaps go up.

The technique employed in (*Continued on page* 50)

Left: Ryan *Navion* makes low pass over wheat field at 75 mph with flaps lowered to stir chill morning air to prevent moisture from condensing into frost on the wheat.

Right: Piper *Super Cub* about to touch down with flaps extended for short landing roll

ELMIRA



Typical scenes, above and on opposite page, at Elmira, N. Y. during glider meet. Note cumulus clouds so important to soaring.

TWENTY-FIVE YEARS AGO the Soaring Fraternity first came to Elmira, N. Y. This July will mark the eighteenth year of return to the site. Sailplane wings were clipped during the war; three other years the National Championship Meet went south to Texas and once west, to California.

A power plane pilot may wonder what these contests prove? Even a glider pilot, not too many years ago, was heard to remark, "Sometimes I think we're nuts. We drive several thousand miles to be thrown off a hill. We see who can fly the farthest while the ground crew hauls the trailer all over the blasted country-side looking for us. And when we come down, we rush back to the hill to get tossed off the cliff again!"

The point? To test the design and engineering that has gone into the sailplanes . . . designs that have often been incorporated in powered aircraft; and knowledge of meteorological conditions encountered. But the intangible results perhaps stand foremost. For soaring is a challenge. It has more to offer in the way of competition than almost any other sport. And it is fun.

The pilot who made the remark? That year he went on to become National Soaring Champion and is now one of the world's outstanding pilots. He laughed at himself and his fellow contestants but he and they were back the next year and chances are they will return ten years from now.

Let's stand on Harris Hill and watch for a minute. You feel a slight northwesterly wind against your face—air that was cooled as it ascended the slope from the valley floor. A few small cumulus clouds start to appear. You hear the sound of a Stearman taking off, look up and, about 200 feet behind him on the end of the rope, you see a sailplane. They climb to 1,000 or 1,500 feet, the glider releases, the tow plane dives, banks toward the field, makes a low pass and drops the rope. The sailplane is making passes back and forth across the ridge accompanied by a few buzzards who are also taking advantage of a free ride on the upcurrent. Suddenly, the glider starts to spiral. With the completion of each circle, his altitude is higher than before and soon he is just below a newly formed cumulus.

Many of the gliders are still on their trailers, others are being assembled, an extra instrument being fitted and the wings being polished. You notice that there is a considerable variety of materials from which the sailplanes

"The Gliding Capital of America"
in the rolling hills of Chemung County, N. Y.,
celebrates its 25th anniversary.

By BETSY WOODWARD

have been constructed. Some are all metal; others all wood. Some are constructed of steel tubing and fabric and a few have even taken advantage of plastic materials. But regardless of what has been used, you know that one thing is certain. One look at these long, tapered-wing craft and you know that they belong to the wind and sky.

Twenty-five years ago, the Warren E. Eaton Motorless Flight Facilities were hardly a dream. In 1930, Dr. Wolfgang Klemperer was assigned the task of deciding upon a suitable site from which the first U. S. National Soaring Contest could be held. Dr. Klemperer, who had become the world's first "C" pilot in Germany and who is now a research engineer at Douglas Aircraft, made expeditions to various parts of the country and decision was made to have Jack O'Meara try out the hills of Chemung County, N. Y. The success of Jack's investigations coupled with the financial help obtainable from the area, led to holding the first national contest in September, 1930.

The event was attended by 25 glider pilots including Wolf Hirth, a visitor from Germany, and one of the pioneers of world gliding. At this meet, Hirth made the first cross-country thermal flight ever flown under a clear sky. Until then, nearly all soaring flights in this country utilized ridge upcurrents. However, in Germany a number of cross-countries had been made under, and in, cumulus clouds. It was shown at Elmira in 1930 that thermal currents, even without clouds marking them, are strong enough to sustain sailplanes.

Four years later, the contest moved from the Caton Avenue Airport to Harris Hill and, in 1937, the present facilities were available for the first time. These facilities on Harris Hill, developed by the Chemung County Board of Supervisors with the aid of WPA funds, virtually guaranteed that Elmira would retain the title of "Gliding Capital of America".

The 1937 contest marked the largest number of entrants, 147, ever to participate in a national meet. That was also the year the Elmira Area Soaring Corporation (EASC) was formed and, from that time on, this group has had responsibility for conducting the meets. Formerly the Association of Commerce underwrote expenses and then, as now, many local business men provided funds for the operation.

In 1939 a meteorologist, Barney Wiggan, chief forecaster at Buffalo, N. Y., was assigned to the contests by the Weather Bureau. At that (*Continued on page* 65)

HANGAR FLYING

EDITOR'S NOTE: *Exchange of flying experience has been historically of high value to the development of American airmanship. Since such exchange is less feasible at modern airports,* FLYING *hopes to project that value through the medium of a monthly section entitled "Hangar Flying." All airmen are invited to contribute to this section as a service to fellow pilots.*

I'M DAVE BRAZIL from Lewiston, Idaho.

It was late winter when a friend asked me to fly him from Boise to Lewiston, Idaho, a two-and-a-half hour trip in the Luscombe. The air was clear and frosty but there would be clouds over the mountains and headwinds high up.

Eighty miles out of Boise, we were at 9,000 and soon passed Council Peak, a favorite check-point of mine, several minutes behind schedule. Evidently the wind had picked up but this was no cause for worry as we were now halfway to Grangeville, where we could make a gas stop.

As we approached the highest ranges, scattered clouds appeared and we were soon among them. Within minutes these became so numerous we had to climb higher. At 11,500 we were able to level off. The 10,000-foot Seven Devils Peak lay a short distance west of the route we were following. I noticed they would be intermittently visible for a few minutes, then hidden again by fast moving cumulus. Familiar checkpoints, seen through the broken overcast indicated that our ground speed had been considerably reduced during the last few minutes.

Another cloud bank rolled toward us. We had to climb an additional thousand feet to avoid it. The stuff was now building up rapidly. Although still broken, the openings were becoming notably scarcer. Right then, I should have turned back in the face of these rapidly changing weather conditions, but foolishly decided to go on. Grangeville was now only 50 miles away.

We had just passed the highest peaks when the clouds suddenly boiled upward about us. The air became turbulent. I decided to turn and fly back out of our predicament. The turn was only partly completed when I could see back in the direction from which we had come. There too, the clouds had built up above us so closely that they seemed about to engulf the little Luscombe.

My decision had come too late. We were trapped!

Back on course, we headed toward the Big Salmon River near Riggins. There were no openings now. Rugged mountains and deep canyons lay beneath. The upper surface of the clouds had roughly taken on the shape of the terrain below. Peaks and mountain ranges were exaggerated in height and grotesquely twisted into queer and fearsome positions.

Never having flown at 14,000 feet before, I could not understand why it was necessary to hold such a high angle of attack to maintain level flight. The low indicated airspeed worried me. I felt sure something was wrong with the motor.

A wisp of fog popped up ahead of us. The instant we hit it, the windshield was frosted so heavily we could not see directly forward. The motor roughened noticeably. Frantically, I pulled on carburetor heat. It seemed ages before the motor ran smoothly again.

We were skimming just above the fluff at the bottom of the heavenly canyon. To say that I was scared silly would be putting it mildly. By pressing my face against the side window, I was able to see ahead well enough to pull on carburetor heat as we approached wisps of cloud. For the longest, toughest, and most fear-ridden hour in my life, we flew northward in this manner.

Suddenly the mountainous billows gave way and the clouds became flat and level. Grangeville Airport lay somewhere underneath, but thousands of feet of unbroken cumulus hung between us and the good earth.

By this time, zero was near on the gas gauge. The climbing and heavy headwinds had taken their toll. The

"I sat back waiting . . . a small circular opening appeared."

engine would quit within minutes. I decided, when this happened, I would spin down through, in hopes that there would be sufficient ceiling for a recovery.

My mind made up, I lit a cigarette and sat back, waiting. Suddenly a small circular opening appeared. It was like looking down through a shotgun barrel. A tiny bit of snow-covered earth, with two evergreen trees, in sharp contrast with the surroundings, lay at the bottom.

I rolled the ship over into a vertical bank, pulled the carburetor heat on and closed the throttle. We headed down in a tight, nose-low spiral. We shot through 10,000 feet of overcast at a speed surely never equaled by any other Luscombe. As we neared the tree tops, I eased the ship into level position. We tore into a squally snowstorm just above the buildings of Cottonwood, Idaho.

The visibility was poor but fear has its relative values. After being as scared as I had been for the last hour, our problem now seemed pretty tame. I knew the country well. We flew just above the telephone poles along the highway to Grangeville, 20 miles away.

The attendant at the airport looked at me with a cold gleam in his eye as he pumped 13 and seven-tenths gallons of gas into our 14 gallon tank. END

I'M BOB COLLINS from Crossett, Arkansas.

A number of years ago—when I had 100 hours—there wasn't much about flying I didn't know. I had instrument time—three hours in a Link.

It was a beautiful day in Dallas and, although CAA said the ceiling was down to 400 feet a hundred miles east, Little Rock had 2,000 and I had a date there. So I climbed into my Piper PA-12, complete with turn-bank, oil gauge and a not-too-reliable radio.

Never having flown on top, it still would be no trick for a pilot such as I to ride the beam to Little Rock, and let down a few minutes out. I had heard CAA frowned on such antics without clearance, so I didn't mention my trip to these servants of the people. But I took all sorts of precautions such as being sure my watch was running and checking the Little Rock call letters.

An hour out of Dallas, I ran into low clouds. But I had the answer. I just pulled back on the stick and stayed in the sunshine. It was real nice in the sunshine and the first thing I knew I was at 6,000 with the clouds just below me. The Little Rock Beam was coming in strong and I had nothing to worry about.

My fine sense of time and distance soon told me that it was time for a let-down. I had heard talk of vertigo but that didn't apply to old pilots. Besides, I would only be in the soup a few minutes before getting underneath. The altimeter said 6,000 feet and the last report gave Little Rock a 2,000-foot ceiling. I throttled back, careful to pull on carb heat, and stuck my nose in the soup. In a second, I seemed to be sitting in a steam bath, but the air-speed was on 80 and the tach registered 1,500 rpm. The altimeter began to click off the hundreds of feet.

The air speed picked up to 90, then 100, and I eased back on the stick and felt my seat grow heavy. I glanced back at the air speed and it was up to 120 and the seat of my pants was getting heavier. Something seemed wrong, so I chopped the throttle. The air speed continued to pick up. A glance at the tach showed the needle gaining even without throttle. I applied a little more back pressure and felt myself driven down in the seat. The air speed had gone haywire and the needle was over the red line. I yanked on the stick some more and almost drove myself through the seat. Another glance at the air speed showed the needle had run out of numbers.

"I heard CAA frowned on such antics . . . so I didn't mention my trip."

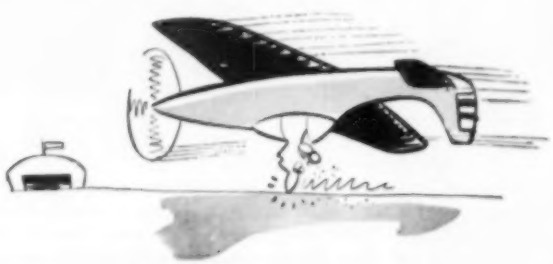
I don't remember what happened next—maybe I blacked out. Then I saw the ground but it didn't seem just right. I must have been on my back. I kicked the rudder and knocked the stick around the cockpit. I eased back on the stick in a long, slow pull-out that left me at 500 feet over some wicked looking hills.

Ten minutes later, after a very sloppy landing at Little Rock, I shakily figured out what had happened . . . a graveyard spiral. I realized that a glance at the turn-and-bank would have shown the ball centered and the needle as far over as possible . . . It's now 1,500 hours later and I know a lot less about flying. END

WHEN THIS HAPPENED, I was Lt. L. E. Pollack, AAF, and flying P-40's in New Guinea against the Nips. But fighting wasn't enough to satisfy our youthful hunger for excitement. When the *Zeros* couldn't provide thrills, we invented our own; rat races through the sky, one plane after another, props chewing at the plane in front, the whole squadron in gigantic loops, barrel rolls and Immelmanns.

When we flew singly, each man used his own ingenuity to impress other pilots.

There was West, who buzzed the runway, pulled up into a loop, lowered his gear and landed out of the loop. And Smitty, who flew so close to the waves that he collapsed his belly tank. Cutting the Kuni grass was a popular pastime, flying so that the propeller sent up showers of grass, the plane looking like a giant lawn mower.



"The runway was a blur and coming closer."

My own specialty was flying upside down 30 feet off the deck and preferably down the runway. I spent hour after hour practicing at high altitudes before I tried it close to the ground. I practiced by using cloud layers as a guide, flying inverted over the clouds until I was certain that I could do the same over the level valley floor. My first attempt was successful. After my initial success, I used the maneuver whenever I felt the need for a little additional excitement.

One day the C.O. detailed eight of us for a ferry job. We were to take two Jeeps and drive over to the maintenance squadron and fly back eight of our planes they had finished repairing. Most of the chutes we used were equipped with life rafts, folded compactly and placed over the regular parachute pack, making the pack about five inches thicker. Since the pilot sits on the chute and raft, this puts him about five inches higher in the seat. I grabbed the nearest chute and climbed into one of the Jeeps. Just as we were leaving, one of the other pilots noticed that the chute that I had didn't have a raft on it. He reminded me that it would make a difference in attitude once I was in the plane. Since we were ready to pull out, I decided not to exchange the chute.

We Jeeped the five miles to the maintenance strip, received our plane assignments and took off. This would be a good time to demonstrate (*Continued on page 60*)

THE RAF

The Handley Page *Victor* crescent-wing bomber.

The Avro *Vulcan* delta-wing bomber powered by four Bristol Olympus turbo-jet engines.

An evaluation of Britain's new jet aircraft emerging from the gestation period of the past decade.

By WILLIAM COURTENAY, O.B.E., M. M.

SUMMER OF 1955 WILL see the Royal Air Force manning some significant new designs.

At conclusion of hostilities in September, 1945, the British Air Ministry decided to look far ahead for postwar military craft. It appeared then as if no war were on the horizon, and a development period of up to 15 years could be envisaged. The RAF was to be given new types of aircraft for Squadron use by 1960.

Change over from piston engine types to the jet was then taking place. The period from 1945 to 1955 was envisaged as a period of gestation for jet power. However, the deteriorating world situation following the Berlin Blockade in 1948, caused the Air Staff to revise plans. Specifications for new jet Bombers then went to the industry from the Air Ministry. Three firms competed, and each was given an order as the world picture worsened.

A. V. Roe & Company proposed the Delta-winged *Vulcan*, powered with Armstrong-Whitworth *Sapphire* jet engines of over 8,000 lbs. thrust. Vickers proposed the more orthodox *Valiant*, using four Rolls-Royce *Avons* of comparable power. Handley Page proposed a Crescent-winged bomber with *Sapphire* jets—aiming to combine the best principles of both Delta configuration and sweep-back.

The first *Valiant* crashed in January 1952. The first *Victor* crescent-wing lost its tail in high speed trials. The *Vulcan* passed through smoother waters. Eventually however all three models got squared away for production.

The first *Valiant* Squadron as a result, will form up this summer, though expected to be formed in 1954.

The first *Vulcan* Squadron may form up before the close of 1955, but certainly early in 1956. The first *Victor* Squ dron should follow in 1956.

While performance figures are secret, it may be stated that in the British concept, each of these bomber types will be capable of reaching targets deep in the heart of Russia from British bases and of returning—without mid-air fueling; that each will be capable of speeds well over the 600 mph figure and of flying at 50,000 feet or more; and that all will carry nuclear weapons.

Whereas the *Valiant* first flew on May 18, 1951; the *Vulcan* on August 30, 1952, and the *Victor* on December 24, 1952, it will be 1955 and 1956 when the RAF is equipped; and the next year, rather than this year, before one can say crews are fully conversant with flying, navigation, maintenance, and bomb dropping for an operation venture at full efficiency. This will be four years earlier than the Air Staff originally planned re-equipment of the RAF.

In the Interceptor Fighter situation, Hawker's *Hunter* and Vicker's Supermarine *Swift* are the two aircraft upon which the RAF has been pinning its hopes since 1945. The *Hunter* is descended from the famed *Hurricane* which, despite the glamour associated with the *Spitfire*, played the greater role in the "Battle of Britain".

Hawker designed its first jet Fighter, the "1040" with straight wings and tail, in 1947, using a Rolls-Royce *Nene* engine of 5,000 lbs. thrust. This later became the *Seahawk*—a 600 mph interceptor now adopted as a standard type for Royal Navy aircraft (*Continued on page* 71)

TODAY

◀ The Vickers *Valiant*, long range military transport, cruises at 600 mph and carries 100 troops.

▶ A 650 mph night interceptor, the two-place, delta-wing Gloster *Javelin* is radar-equipped

▲ The Folland *Midge*, a single-seat fighter with an Armstrong Siddeley Viper jet engine.

▲ The English Electric P 1 fighter powered by two Armstrong-Siddeley Sapphire turbo-jets.

The Blackburn *Beverley* freighter, first British plane designed to drop heavy military gear. ▶

TURBO-PROP 97 Above: First of two *Stratofreighters* modified for the Air Force to serve as test beds for the P & W T34 turbo-prop engine, the Boeing YC-97J tanker-transport is shown here on its maiden flight. The four T34's provide 5,700-hp each as compared with 3,500-hp from piston engines. Turbo-prop installation has decreased the ship's empty weight by almost 5,000 pounds and enables the double-deck *Stratofreighter* to take off in a shorter distance and cruise at much higher speed at greater altitude

HAVE YOU

LOW COST FLUT-R-BUG

Stits Aircraft has come up with what it claims is "the world's lowest cost sportplane." Selling in pre-fabricated kit form for $695 plus $249 for the 65-hp engine, or for $1495 fly-away-factory, the single place *Flut-R-Bug* cruises at 88 mph, lands at 40 mph, has a range of 200 miles, rate of climb over 1,000 fpm, 12,000 ft. service ceiling. Net weight is 450 lbs; power loading 10.4 lbs/hp; wing loading 6.4 lbs/sq. ft. Information may be obtained from Stits Aircraft, P. O. Box 3084, Riverside, Calif.

FLYING PLATFORM Developed for the Navy as a one-man utility vehicle, the Hiller "flying platform" uses a new principle of lift and propulsion called the ducted fan. Two propellers rotating in opposite directions suck air through holes in the platform and supply a downward thrust which in turn supplies the vertical lift. Enclosed in a circular casing which protects the pilot from the blades, the propellers are powered by separate engines which together develop less than 100-hp. Flight control is radically simplified, being merely a process of leaning in the direction one wishes to go.

SEEN?

CARAVELLE The French twin-jet medium transport S.E. 210 *Caravelle* will carry 70 passengers at a speed of 480 mph. Its jet engines are placed at the rear of the fuselage for increased safety and passenger comfort. Fuel is in four wing tanks.

CESSNA COPTER Still undergoing flight tests which started last summer, the Cessna CH-1 helicopter powered by a 260-hp Continental has a top speed of 122 mph. It can hover at altitudes in excess of 15,000 feet.

Flight Instructor John Green checks student Stanley Sisson, in plane, as Ethel Wolfe, Instructor Cecil Ryan and student Ed Tam look on.

Jerry Hall, Fern Ludwick, Betty Wood McNabb and flight student, Ethel Wolfe chat with CAP National Commander, Maj. Gen. Lucas V. Beau.

SWELL JOE'S

Public school teachers learn to fly at the Third National Aviation Workshop.

By H. E. McNABB

LAST JULY SOME 300 PUBLIC school teachers converged from all points of the compass, inclusive of Alaska and Hawaii, on the University of Colorado, at Boulder . . . the occasion, to attend the third national Aviation Workshop sponsored jointly by the Air Force, the Civil Air Patrol and the University itself.

To begin with, the atmosphere was strictly academic. Dr. Roland Spaulding, the distinguished Professor of Aeronautical Education at New York University, and Dr. Mervin K. Strickler, Educational Chief of CAP, were joint directors of the program. The objective was to provide the teachers with class-room techniques and substantial knowledge of aviation.

Then, before anyone could warn them against throwing matches into a powder keg, the Colorado CAP Wing sent a squadron of its mountain pilots to take the teachers for a ride in their lightplanes. Of course, all the teachers had been aloft before. As a matter of fact most of them had arrived in Boulder via Air Force transport.

But this lightplane business . . . that was something different . . . whee . . . fun . . . scenery . . . excitement. To be sure, no big soft airline seats and meals en route and stewardesses to pass the coffee. Yet something about it that a teacher could see might add zest to the pursuit of knowledge.

Dr. Mervin Strickler, Jr., Director of the Aviation Education Workshop, congratulates Fern Ludwick, first Workshop student to solo

The whole lightplane tour seemed to have been a grand success and something pleasant to remember, when some joker dropped the match. He said, "If we could arrange for it with Boulder Air Service, do you suppose anyone would be interested in taking flying lessons?"

Before the smoke cleared away, 53 of the pedagogues had signed up. Boulder Air Service was caught flat-footed but, like good sports, entered into the spirit of the thing. Wayne Hall and his partner, Tony Schuler, sat down and figured out special instruction rates. From the workshop staff, a half dozen certified flight instructors were recruited to help. Classes for essential ground school were organized and CAA arranged to come up from Denver to take care of Student Permits. Dr. Fordyce McCabe of Boulder set up a production line to give physical examinations.

Since the workshop schedule began at 7:30 a.m. and did not conclude until 4:30 p.m., all the flight instruction had to be given either between dawn and 7 a.m. or between 5 p.m. and dark. Jerry Hall, Wayne's wife, herself a pilot, had breakfast ready at 4:30 a.m. at the airport, so the early birds got a break in that respect.

Some of the teachers took to flying like ducks to water. Fern Ludwick, a school mistress from Royal Oak, Mich., was the first student to solo. Since the entire workshop program lasted but one month and flying time was snatched from the scant hours before and after work, nobody got as far as a license.

On the other hand, all 53 teachers got enough instruction to convey an insight into the advantages of being a pilot. The mass participation broke the ice of shyness about something that is beyond normal routine for the individual . . . especially among adults. Many of the students said they would now feel free to continue instruction at their home town airports. Additionally, those teachers who did not get any flight instruction at Boulder, still got the idea that it was something for a teacher to tackle in the (*Continued on page* 70)

Above: Fox *Moth* picks up a load of Whitebait on the bed of the Paringa River to fly it to Kokitika where it is shipped by rail to Christchurch, thus reaching the market the same day.

THEY STILL DO

Bert Mercer delivers the mail to an outlying district at Haast, New Zealand.

One of Air Travel's planes uses narrow strip of sandy beach for a runway on a regular stop.

Old, obsolete airplanes are well-suited to the needs of New Zealand bush pilots.

By PHILIP V. HARKNESS

A STRANGER in the States must be impressed by the number of obsolescent aircraft he sees around airdromes. Not so out here in New Zealand on the perimeters of the industrial world. We make 'em do—and do, and do.

For example there is ZK-AEK, an ancient Fox *Moth*, once King Edward VIII's private plane, brought in 1934 to New Zealand's South Island. After years of faithful service to passengers and freight, gathering Whitebait from river fisheries, and making many a mercy flight to remote homesteaders, old AEK was "pranged" in a forced landing on Franz Joseph glacier. But was this the end of her? Not for a minute. Carried down from the glacier, she was repaired and, as this is written, is still in regular service.

Nor is AEK the oldest aircraft in New Zealand still used in routine operations. There are five others of the same DH-83 type with the 130-hp *Gypsy Major* engine, and they continue to chug along at 100 mph with three or four passengers over the wild and woolly hinterland of the West Coast of South Island.

Old timers still grin at the memory of the inauguration of air service on the West Coast. Captain J. C. "Bert" Mercer, father of aviation in this area, taxied out in his bright yellow Fox *Moth* preparatory to take-off. But, before he could get airborne, an infuriated bull burst into the clearing, charged the *Moth* and reduced both himself and the plane to a hors-de-combat status. They say the bull and Bert sat there in the wreckage looking at each other with frustration.

Certainly we are not unconscious of jet transports and delta prototypes and the strides of air progress. Yet we also like to make the old things do if they still have a purpose. Our old airplanes are no exception. END

NO. 185

I learned about flying from that !

Over-anxiety to please the passenger proved mighty costly to this charter pilot.

By QUENTIN FREEMAN

ON TWO DIFFERENT OCCASIONS since I began flying in '42, I've had engine failure on take-off. The first one occurred on a rainy Sunday afternoon during the winter of 1945. Due to the fact that I was flying off a 900 foot strip and had rough terrain directly ahead, I violated an old rule—"always proceed straight ahead if engine quits on take-off."

However, luck was on my side. I managed to stagger through a 180 degree turn and landed after a fashion. For many years I've heard pilots say never grumble about a landing you can walk away from. In this case, both my passenger and I walked away grumbling. The landing gear on the ol' J-3 was completely smashed.

In the above case, the reason for engine failure was carburetor ice. However the carburetor heat on this particular ship was inoperative. Therefore, a couple of stiff necks and $200 damage to the airplane.

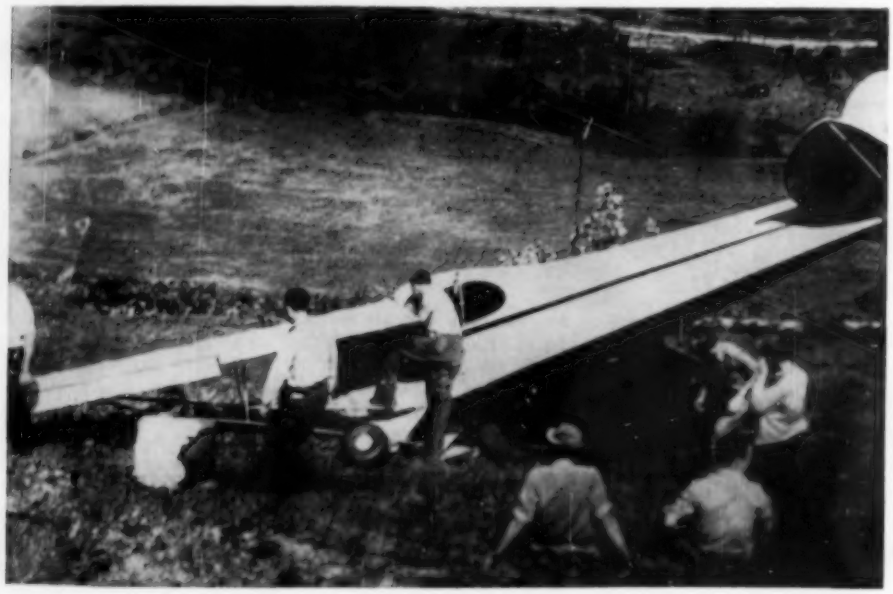
At this time I had just been released from active duty with the Air Force and was managing a fixed base operation at Commerce, a small town in the hills of northeast Georgia. Like most operators, I was anxious to have all ships flying as much of the time as possible. Bad weather and small fields naturally go hand in hand with accidents such as I have described.

The years rolled by with no major accidents occurring in my operation. I had just purchased a new J-3 *Cub* On this particular day, the weather was beautiful. Several times during the morning I found myself wishing someone would want to do a little flying. About noon I knew my wish had been granted as I watched a friend drive up to the airport. He wanted me to fly him to Clayton, Ga., this being a town 65 miles north in the heart of the Blue Ridge Mountain Range. As Clayton did not have an airport at the time, I planned to land on the city golf course and discharge my passenger. From his description, a B-29 could land on the above mentioned fairways easily I started to taxi to the end of the runway for take-off. As I was taxiing fairly slow, the throttle was almost closed and, after approximately 600 feet, the engine suddenly quit. I "propped" the engine and, after it was running again, noticed quite a bit of moisture around the carburetor. However, as I have seen this many times, I didn't give it too much thought.

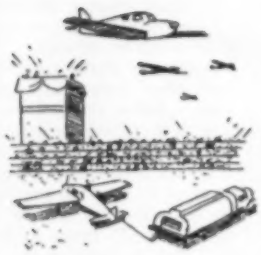
The trip to Clayton was uneventful. After take-off, we were soon over the lower edges of the Blue Ridge at 3,500 feet and clearing the hills by a safe margin. As we watched the pine covered slopes roll by underneath our wings, we certainly had no idea of what was ahead for us.

After 35 minutes, I saw the town of Clayton over the nose of the ship. A few minutes later I was circling, looking for the golf course. After several more minutes and with a growing conviction that it wasn't going to be adequate for a landing, I finally (*Continued on page* 69)

The author's new *Cub* as it appeared after an encounter with carburetor ice.



PLANE FAX



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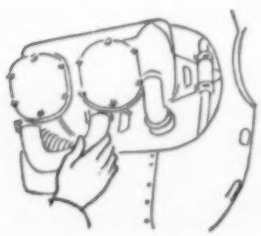

TIP OF THE MONTH

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Automatic Stall Control

(Continued from page 27)

economical to operate.

Engineers decided early in the project that actual flight tests would be the best way to attack the problem, since the motion of a stalled airplane was influenced by so many interacting factors. Gifford Bull, an aeronautical engineer and veteran pilot, was the project engineer and performed most of the flight testing—more than 107 hours in 51 flights. Bull is believed to have more "stalled" flying time than any other pilot in the world.

William F. Milliken, Jr., Head of the Cornell Flight Research Department, did the flying on the first exploratory program—about 37 hours. Tests were conducted at altitudes of 8,000 to 4,000 feet. Most of the flying time was devoted to developing automatic control to the point where it would stabilize the stalled airplane sufficiently to make possible the obtaining of usable data. This exploratory work showed that longitudinal and lateral motions of the stalled airplane could be separated, although only with considerable practice on the part of the pilot. In the longitudinal tests, the pilot kept the lateral motion of the PT-26 small by manipulation of ailerons and rudder.

When the lateral motion of the stalled airplane was tackled, it was decided to attempt stabilization of the airplane by an automatic control. The engineers felt that if a human pilot could stabilize the plane, an autopilot could also be made to do it. A modified Sperry A-12 autopilot was used to control the rudder and ailerons in the stall. The elevator was operated manually while entering and recovering from a stall, but was locked during the stall.

Due primarily to the fact that aerodynamic characteristics of the stalled plane were not well enough known to allow calculation of the proper sensitivities of the autopilot, many adjustments had to be made. In its final form, the autopilot moved the ailerons proportional to roll angle and roll rate, and moved the rudder proportional to yaw rate and aileron position.

On data flights, the pilot removed his hands and feet from the controls and the autopilot was given full charge of the airplane.

As the plane stalled, the pilot would introduce a disturbance to the rudder or ailerons. Some were quite severe. When the disturbance was removed, the airplane returned to a stalled-glide attitude. To get out of the stall, the pilot disengaged the autopilot, unlocked the elevator and pushed the nose of the airplane downward to an unstalled angle of attack. Naturally, the plane lost altitude rapidly during the stalled glides, as much as 3,000 feet a minute with power off.

Engineers at Cornell emphasize that, although a number of problems associated with obtaining flight test data in the stall were solved, continuing investigation will be necessary. But with so much fundamental knowledge now accumulated, it is heartening to foresee that steady progress toward whipping the stall may eventually bring a victory of vast proportions. END

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Don't Be Flippant with Flaps

(Continued from page 35)

the use of flaps depends upon a plane's flight characteristics and the airspeed. For example, our pilot finds himself forced to "hold" in a pattern while on instruments, or in the traffic pattern. Should he use flaps, and if so, how much? Knowing the flight characteristics of the airplane governs the technique. In a certain popular twin-engined aircraft, which is not too stable at cruising speeds, the use of flaps at slow speed does not seem to help much. In a DC-3, on the other hand, one-quarter flaps adds materially to the ease of flight at slow speed, particularly when on instruments. In both cases, however, additional power is required to overcome the increased drag induced by the flaps, and more power means more fuel burned. Finally, inasmuch as slow flight is ordinarily a speed about 60 per cent over the stall, the flaps may be raised quickly, if desired, without fear of stalling or losing altitude.

Once cleared to land, Pilot Friday is told that a strong wind is blowing. In a conventional aircraft, a strong, gusty wind might balloon the plane off the ground as the tail is lowered; in a tricycle-geared craft, a gust would be less hazardous, but might be awkward. A handy rule is this. In wind velocities that are higher than half the stalling speed, decrease the flap setting proportionately. In other words, the higher the wind velocity, the lower the flap setting. Many pilots prefer to use zero flap if the wind exceeds 70 per cent of the stalling speed.

Let us suppose that our pilot is compelled to land 90 degrees crosswind. In this case he definitely wants a minimum landing speed, the highest stability, and the least chance of the wind lifting his windward wing. Combining these factors, we find that one-quarter flap would be advantageous, but that full flap would be disadvantageous. Somewhere in between the two settings is the amount of flap to use, depending upon the flight characteristics of the plane.

We now come to the most interesting part of the subject, and the private pilot can glean valuable information from it despite the fact that it involves aircraft he seldom flies. This is multi-engine operation, in which flaps are used for take-off in heavy aircraft, and in small field operation, by lighter multi-engine aircraft.

To understand flap operation, a pilot should know that there are two critical take-off speeds, called Velocity One (V_1) and Velocity Two (V_2). V_1 is the speed below which take-off cannot be attempted should an engine fail, and is called the *critical engine failure speed;* below this speed, the take-off should be discontinued should an engine fail. V_2 is the speed which provides a margin of safety for take-off and when this speed is attained, the pilot *must* take off. (Space does not permit discussion of exceptional cases, such as extra-long runways which would permit landing instead of a mandatory take-off.) Although Civil Air Regulations do not define V_1 and V_2 in terms of airspeed percentage, an attempt is made here to so define them for the benefit of the non-professional pilot. (V_1 and V_2 must be computed for each aircraft. In a DC-3 for a certain loading, stalling at 72-74 mph, V_1 is 86 mph or 17½ *per cent* while V_2 is 98 mph or 29 per cent higher than stalling.) *Very* approximately, V_1 is about 15 per cent above stall, while V_2 is about 30 per cent above stall. Thus, in a plane that stalls at 60 mph, V_1 is 69 mph and V_2 is 78 mph. Inasmuch as this is based on actual stalling speed, both V_1 and V_2 are lower when flaps are used! This means that the plane can get off the ground sooner, begin climbing sooner, and clear obstacles with a better margin, despite the fact that the rate of climb is actually less when flaps are used than when they are not used.

Why bother the amateur pilot with this information? Go back to Pilot Friday, taking off from a hot runway in midday. Had he not used his flaps, he would never have cleared the obstacles. Even in his single-engine airplane, there was a V_2 speed, at which he was committed to take off and climb, a speed that was lower when he used one-quarter flaps.

Why not, someone asks, use full flaps, or if one-quarter flaps work so well, why not half-flaps? The answer is that the plane would have left the ground sooner, but that both the angle of climb and the rate of climb would have been less; in fact, with full flaps, the rate of climb could be so low that the obstacles would not be cleared. A good pilot knows his

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airplane and the correct technique too.

There are some handy hints for the use of flaps, which all pilots should know:

1. Why could not Pilot Friday have set his flaps in the first place? Answer: He should have. Very little is gained by first accelerating and then lowering flaps.

2. Isn't it better to get into the air as soon as possible? Answer: No. Stay on the ground at V_1, get into the air precisely at V_2, then accelerate to climbing speed. In either single-engine or multi-engine operation, accelerate to about 50 per cent over the stall before raising flaps, or bring them up one degree for each mph over the V_2 speed.

3. What happens if take-off is made at too slow an airspeed, such as V_1? Answer: In either operation, performance is poor; in multi-engine, the take-off cannot be completed should an engine fail. V_2 speed must be reached prior to take-off and the plane accelerated to climbing speed by holding the nose down. If an engine should fail at V_2, hold the plane at V_2 speed in the climb until obstacles are cleared, then accelerate to climbing speed and raise the flaps one degree for each mph above V_2.

4. Is flap setting critical in large aircraft? Yes. If no flaps were used for a certain runway, the take-off run would be so long that obstacles might not be cleared, especially if an engine failed at the V_2 speed. If too much flap were used, the plane would leave the ground sooner, but the rate of climb and angle of climb would be reduced. Should an engine fail, the plane might not clear obstacles.

5. If the plane isn't going to clear an obstacle, why not increase the flap setting? True, this would give an immediate boost of climb, but it would be offset by a subsequent decrease in airspeed and rate of climb. The immediate boost would get a plane over an obstacle, but something drastic would have to be done on the other side, such as lowering the nose to get enough speed to permit raising the flaps again.

In this connection, some pilots have succeeded in making the field by lowering additional flaps. An immediate boost of altitude is obtained at the expense of speed, which enables the pilot to clear an obstacle or to land farther; actually, the plane comes to a stop sooner (shorter rolloff) than it would have, had no flaps been used. Flaps, used during the glide, shorten the glide by increasing drag, which in turn increased the angle of glide and the rate of descent.

6. Is there any advantage in using a V_1 or V_2 speed for single-engine lightplanes? Yes. Although this may sound farfetched, the pilot who knows that he can take off in a shorter distance with one-quarter flaps, who knows he should hold the airplane on the ground until he has V_2 speed, and who knows flaps must be raised slowly until V_2 is exceeded, will be a more competent pilot. Multi-engine pilots who observe V_1-V_2 with flaps will act quicker, more competently, and consequently with greater safety should an engine fail during take-off.

And in that connection . . . please, no *flippant* remarks from the single-engine pilots! END

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The Bypass Engine

(Continued from page 25)

bination will prove a particular boon to jet airliners. Until now, no jet transport is designed around anything but straight jet engines. The answer, of course, is noise. A 40 per cent thrust augmentation on take-off would mean vast increases in payload, or shorter take-off runs, or a combination of the two. Every operator quails at the thought of the little guy in the bungalow off runway 26, who will be shaken out of bed by the thrum of the reheat units. The bypass will take the teeth out of that problem.

Apart from those already mentioned, only one true bypass jet engine has been officially released. It's the *Conway*, built by Rolls-Royce. Past products of that firm, ranging as they do from the *Merlin* and *Griffon*, through the *Dart*, *Derwent* and *Nene* to the current *Avon* series, augur well for a superb engine.

The *Conway's* first installation will be in the Vickers 1,000—a 150 passenger troop transport, with four engines, rated at 11,000 lbs. thrust each, which should push it along at 550 mph. It is significant that a civilian transoceanic version is contemplated—the Vickers V.C. 7, probably powered by up-rated versions of the same engine. In the U.S. air transport field, several manufacturers are rumored to be interested in the *Conway* for transports now on the drawing boards or in mockup.

A less pleasant form of foreign competition was hinted during last fall's show of Russian planes over Moscow. The sensation of the day was of course the long range four-jet bomber by Tupolev, dubbed the *Bison* by U.S. recognition experts. The size of our own eight-engined B-52, this monster was powered by only four mighty engines. Their power was estimated at a startling 15,000 lbs. of thrust each; but even this output would not have justified the colossal air intakes of the power units. Their six-foot diameter suggests the scope of Russian work in the bypass engine field.

So far as is publicly known, no American manufacturer has produced an engine of this type, or is working on one. END

Supersonic Boom—A New Weapon?

(Continued from page 33)

of damage exceeded that of their predecessor, the Flying Bomb. This was most peculiar, since both weapons carried identical loads. Moreover, in spite of high-speed impact fuses, V-2's, augering in at some 2,500 mph, usually found time to bury themselves before the warhead went off. This should—and did result in less blast than the V-1's, which went off at ground level.

At the same time, Londoners wondered amongst themselves about a "Double Boom" effect. First there should be the detonation of the V-2 warhead; seconds afterwards, a secondary explosion would follow on its heels. We know the answer now. In the laconic words of an expert, uttered this past February, ". . . the double explosion of Hitler's V-2's . . . was a sonic bang . . . a good deal of the resultant destruction was doubtless caused by the shock wave."

For a more recent, closer-to-home demonstration of supersonic pounding, you may recall the first public demonstration of the F-100 *Supersabre* at Palmdale, almost two years ago. It featured a low altitude pass at Mach 1 plus. Unintentional results were shattered window and door frames, large cracks in the walls of airport buildings, window panes blown in with such violence that slivers of glass buried themselves in plaster walls.

The Palmdale damage was caused by an aircraft of relatively small frontal area, flying just above the speed of sound. Moreover, it made its thundering pass several hundred feet above the deck and did not fly directly over the damaged buildings. Even so, the unexpected side effects so impressed military and civilian observers that new regulations were immediately issued to flight personnel No more supersonic flight below 10,000 feet or over inhabited areas; airliners must be given a 5,000-foot-wide berth when flying above Mach 1 at altitude.

The Supersonic thunderclap may first come into its own as a weapon when the new Convair B-58 four-jet bomber enters squadron service. Approximately nicknamed the "Hustler", this huge, delta-wing job is said to be our first bomber capable of level supersonic flight. Next to the massive shock wave generated by this behemoth, the single-engined *Supersabre's* pales into insignificance. Shock waves, like the wakes of ships, increase in violence with the frontal area of the plane or missile which generates them. At their widest point, the V-2's were only about three feet in diameter; the fuselage of the F-100 is about seven feet high by five feet wide. While its exact dimensions are, of course a well-kept secret; the B-58's fuselage dimensions should approximate the B-47's, with wings and tail surfaces to match. To this must be added the shock cones slamming down from the massive J-79, 15,000 lbs. thrust turbines, hung in pods under each wing.

Picture the drastic by-products of a roof-level buzzing by the bat-shaped Hustler. It could cut a swath of destruction extending some 200 to 400 feet on either side of its path. Directly underneath, the shock wave would exercise a sudden jolting pressure of some 75 pounds per square foot—equivalent to an instantaneous 180 mph hurricane. This kind of blast would be sufficient to smash unprotected brick structures, destroy or damage unarmored vehicles, and capsize vessels at anchor in port. Further out, forests would be leveled, crops uprooted, herds dispersed and nature herself thrown into confusion.

Naturally the advent of hydrogen power makes these results seem puny compared to a 15-mile radius of total annihilation. However, it must be remembered that this narrow but devastat-

(Continued on page 56)

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(Continued from page 54)

ing path could be extended for as many miles within enemy territory as fuel permits; that it could be curved along traffic arteries which bombs can only interrupt; and that the supersonic boom would probably become a routine side effect of any future air raid.

It is also likely that there will always be targets too small to warrant expenditure of even a tactical A-bomb; here's where the supersonic "jet boomer" will come into its own. The effect of a shock wave raid on an arctic airbase, leaving personnel exposed to sub-zero temperatures, could be quite paralyzing; and when H-bomb and A-bomb raids are followed up by this kind of supersonic strafing, it could in itself become a panic weapon of the first order.

The current drive for an enlarged Ground Observer Corps stems from the need to track enemy raiders sneaking through or under our radar curtain. A supersonic buzz job might smash this link in our defenses without firing a shot. Shock waves cannot touch armored or underground installations, but they can wipe out observation towers in the open country. All along the flight path of the intruder, telephone and power lines would be severed.

Shock waves will not, on the other hand, play a substantial part in air-to-air combat. Modern combat planes, built to drive through the sound barrier, are rugged enough to shrug off the wakes left in the passage of other jets. An F-100 recently shot past an F-86 far above the speed of sound, and the pilot of the "slow" 670 mph *Sabre* didn't even feel a bump.

In peacetime, supersonic flying and supersonic bangs will present few dangers. We have already seen that new military regulations will protect city inhabitants, air show spectators, and airline passengers. It is not even foreseeable when we shall have supersonic airliners, due to the fantastic amounts of fuel required; but we can rest assured that when they come, they will never hit their full "cruising" speed until they've climbed to their most efficient ceiling—some 12 miles up.

However, the advent of the shock wave means the end of an era in sport flying. The Schneider trophy competition is just about finished. This trophy has been awarded for more than 20 years for the swiftest run over a measured course of about three miles. Regulations of the Federation Aeronautique Internationale state that the four up-and-downwind passes permitted to each new contender must be made at about 300 feet altitude so as to lend themselves to a proper camera and chronometer check. The current record is held by another F-100, which attained 754 mph, or about .98 of the speed of sound. Since the regulations further state that to break the previous record, each newcomer must exceed that record by at least one full per cent it would appear that this is the last subsonic Schneider award. In actual fact, it may well be the last Schneider trophy, period. It is easy to imagine the effect of four successive supersonic passes on the sensitive measuring instruments along the three mile course—or for that matter, on the even more sensitive human observers. END

A. P. Wirephoto

HELICOPTER RESCUES PLANE

When a privately owned Cessna 180 sank in an unnamed lake in northern Quebec, accessible only by air, the RCAF came to the rescue with a Piasecki H-21 helicopter.

MAN AT WORK

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A S L ferrite LOOP ANTENNA

a tiny nose for your favorite bird dog

This is the frontal profile of the loop furnished by Aircraft Specialty Lines as part of the Automatic Station Locator antenna system.

Smaller than any other standard loop installation, yet fully as powerful. Designed to operate in fixed position. Will measure as little as 1° change on A S L indicator at high sensitivity settings.

WEIGHT: 7 ounces
DIMENSIONS: 2" x 2" x 8"

- Full electrostatic shield.
- Lifetime phenolic pressure-molded housing.
- Exceptionally fine null point.
- Long range operation.
- No appreciable drag even at high speeds.

Complete with 10' co-axial lead $29.50 POSTPAID

The AUTOMATIC STATION LOCATOR

A direction finder custom tailored for your low frequency receiver. Weight 3 lbs., 15 oz. Current drain .2 AMP.

Available for GE, Bendix and Narco.

★ Does not load power supply.
★ Indication is fast and simple.
★ No unpleasant noise.
★ 100% guarantee for one year.

$195 FOB Phoenix, Ariz. complete with A S L Ferrite loop.

AIRCRAFT SPECIALTY LINES
10200 N. 19TH AVE.
PHOENIX, ARIZONA

Airborne Radar

(Continued from page 21)

A length of rectangular aluminum pipe called "waveguide" connects the antenna to the Transmitter-Receiver unit which may be mounted at some convenient location in the airplane.

Another unit known as the Synchronizer-Power Supply may also be located where convenient.

A Control Box is mounted in the cockpit, preferably in the radio panel, and contains all but one of the necessary operating controls.

One or more 'scope type Indicators are also mounted in the cockpit and each Indicator contains its own range switch. The switch permits the pilot to utilize the full range of the radar (150 miles) or he can switch to 50 or 20 miles for a more detailed observation of the weather ahead. If two Indicators are used, each pilot can select whichever range he desires, thus giving maximum flexibility to the system.

The Control Box contains a Tilt Control so that the radar may be used to examine the storm at the aircraft's cruising altitude; or the radar beam may be tilted up or down to examine the weather at other altitudes. By tilting the beam down still further, the radar will sketch on the Indicator an outline of the ground below. Mountains, cities, coastlines, rivers and lakes make excellent radar targets and it is possible to locate position quite accurately by reference to the radar picture.

Although military radars have been used in the past for weather navigation, they suffered from a characteristic which, until now, has prevented radar from providing sufficiently accurate information to permit safe penetration of a weather front.

This characteristic is the inability of a radar indicator screen to show more than a very limited range of variation of rainfall even though the radar is inherently capable of measuring a usefully wide range. Therefore, if the airplane were flying in an area of uniformly heavy rainfall, the entire indicator screen would be lighted and those areas where the rainfall increased rapidly would be washed out by the radar return from the overall area rainfall.

The reason we are interested in the rapidly changing rainfall areas is that turbulence in thunderstorms is associated with high rainfall gradients, i.e., where the change in rainfall is high in a short physical distance.

To overcome this difficulty, a special circuit was designed with the impressive sounding name of iso-echo contours. Actually, this is a very simple addition to the radar set and, because of the special picture it produces, puts the radar in the category of a highly useful pilot's aid rather than merely an interesting device with only limited application.

A switch on the pilot's control box provides for Contour-On or Contour-Off. With the switch in the "Off" position, the radar will show general areas of precipitation; for ground mapping, the Contour circuitry is also turned off.

When the Contour switch is turned on, the Indicator automatically blanks out in those areas where the rainfall is higher than a pre-set amount.

Accompanying pictures show typical storm returns with the Iso-echo contour circuitry in operation. Where the black areas are small, or where the lighted areas surrounding the iso holes are narrow, the turbulence is high.

These typical pictures show how easy it is to choose a path which will avoid areas of high turbulence. It should be emphasized at this point, that a weather radar only shows turbulence associated with rainfall—such turbulence as the air variety is not displayed at all.

Bendix has a DC-3, popularly known as the "Flying Showcase," which incorporates the RDR-1 Radar. It is an amazing experience to fly in a thunderstorm area or to penetrate a squall line navigating solely by radar. In many hours of deliberate thunderstorm flying, only the mildest turbulence was ever encountered, and this when other aircraft were reporting heavy turbulence and seeking ATS approval for major route detours.

We may summarize the useful features of the new radar as follows:

1. It will provide dependable flight safety in thunderstorm areas and permit penetration with only minor detours from flight-planned track.

2. It will provide greater economy of aircraft operation by eliminating the need for turbulence checks and by eliminating lengthy detours.

3. It will permit operation in weather which would otherwise justify cancellation of a flight.

4. It will vastly improve both passenger and crew peace of mind when flying in thunderstorm conditions.

These features can be obtained at an equipment cost of approximately $17,000, a weight penalty of 150 pounds, and an electrical power requirement of approximately 1 kva. Already, about 20 of the systems are flying in airline and executive transport airplanes and it is generally agreed that, in a few years, no true all-weather airplane will fly without this device.

END

"If nothing else, it'll start an investigation."

Now Twin-Engine Business Transportation at Practical Cost with the PIPER *Apache*

Now in higher production than any other commercial multi-engine airplane and already in the service of many leading corporations, the twin-engine Piper Apache admirably fills a long-felt requirement for a fast, economical, twin-engine airplane.

Powered with two 150 horsepower Lycoming engines, the Apache cruises 170 mph at optimum altitude yet can land as slow as 52 mph to permit using any existing airport. And since it represents just half the investment of most other twins, there's little wonder that acceptance of the Apache by American business has far exceeded expectations.

If your company already uses single-engine equipment, the Apache might well be the next logical step for round-the-clock utility. If you already operate larger multi-engine equipment, the Apache is an ideal supplement to extend benefits and savings of company air travel to more key personnel more often.

Or if you have not felt, up to this point, that investment in a company airplane was justified, a study of the Apache's unique capabilities, unusual safety features, and substantial money-saving economics may well permit you to revise your estimates.

Your Piper distributor will be glad to help you with such an analysis and demonstrate the Apache to you. For a complete 24-page manual on the Apache write on your letterhead to Executive Sales Department, Piper Aircraft Corp., Lock Haven, Penna.

PIPER AIRCRAFT CORPORATION
LOCK HAVEN 3, PENNSYLVANIA

PROVED AND ACCEPTED

Transoceanic flights have *proved* Apache stamina—one flew 5,600 miles non-stop, New York-Paris; a second, non-stop across the North Atlantic; a third, non-stop across the South Atlantic; many to South America. All routine delivery flights!

Here are a few of the hundreds of corporations and individuals who now own and operate Piper Apaches:

Ashland Oil & Refining Co.	Ashland, Ky.
Branyon Drilling Co.	Cushing, Okla.
Buttrey Stores, Inc.	Minneapolis, Minn.
Clinton Machine Co.	Maquoketa, Iowa
Crosley Broadcasting Corp.	Cincinnati, Ohio
El Paso Natural Gas Co.	El Paso, Texas
Florida Power & Light Co.	Miami, Fla.
E. & J. Gallo Winery	Modesto, Calif.
C. F. Kettering, General Motors Corp.	Dayton, Ohio
Miller Construction Co.	Windsor, Vt.
Odessa Natural Gasoline Co.	Odessa, Texas
Pursglove Coal Co.	Clarksburg, W. Va.
Reynolds Metals Co.	Richmond, Va.
Sinclair Oil & Refining Co.	Caracas, Venezuela
St. Johnsbury Trucking Co.	St. Johnsbury, Vt.
United Fire & Casualty Co.	Cedar Rapids, Iowa
Uranium Enterprises	Grand Junction, Colo.

Comfort. Wide rear seat and individually adjustable front seats in quiet, luxurious, spacious cabin make Apache travel truly restful for four people.

Night and Day. Two dependable engines and full instrumentation give the Apache owner round-the-clock, night and day utility. Cruises 170 mph.

On One Engine, Apache maintains 6,750-foot ceiling at gross load; 8,000 to 10,000 feet with average load. Twin-engine ceiling is 20,000 feet.

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YOU, as a Parks graduate, will benefit from the world-wide reputation of Parks and Parksmen as leaders in aviation!

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You may earn a B.S. degree in Aeronautics in:

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(Air Force ROTC allows you to complete your education without interruption.)

Non-degree courses available — CAA Approved, A & E Mechanics — 45 weeks covering all phases aircraft and engines.

Flight courses — Private, Commercial, Instrument, Instructor and Multi-engine Ratings.

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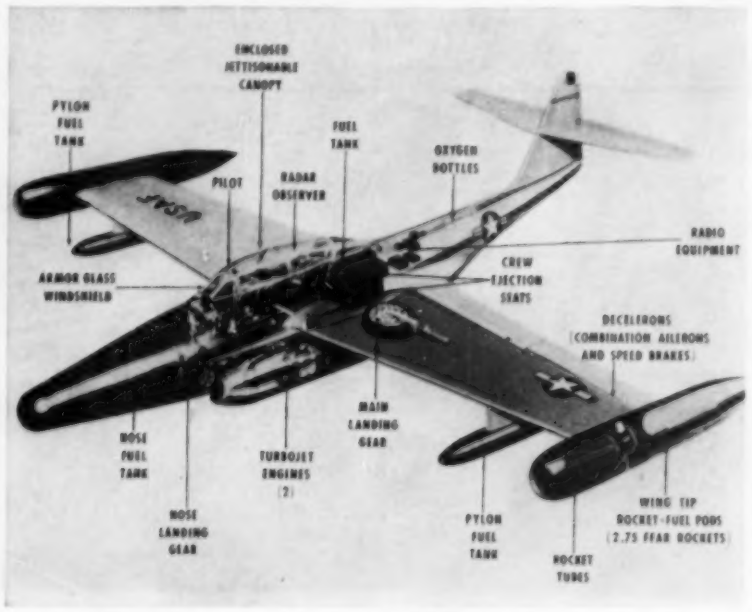

ON GUARD!

LOCATION, interception and, if hostile, destruction of unidentified aircraft by day or night under all weather conditions is the mission of Northrop *Scorpion* F-89D's, the USAF's most heavily armed all-weather interceptors, manning Arctic defense from Alaska to Greenland. (See Front Cover.)

Powerful electronic radar, an accurate fire control system and 104 high-explosive, air-to-air rockets emphasize combat effectiveness in this high-altitude, twin-jet aerial destroyer.

First of the "grand slam" interceptors to arrive in Alaska was named "Alaskan Skywatch" in honor of Alaskan Ground Observer Corps volunteers who maintain a constant vigil in searching Territorial skies for unidentified aircraft.

In the above photo, Maj. James V. Beckett, right, discusses the route to Alaska prior to take-off from Ontario, Calif. With him are (left) his radar observer, Lt. Peter N. Choconas, and Capt. Emerson Fitzgerald, Southern California operations officer for the GOC.

Hangar Flying

(Continued from page 39)

our flying skill to those poor maintenance pilots and their ground crews.

Diving to pick up speed, I flew down the runway. Now—left rudder, left stick and forward pressure. The P-40 rolled to the left and I was upside down. There was the ground, 30 feet below and streaming past at 200 mph. But somehow things didn't seem the same. The plane's altitude was not right; the nose was too near the horizon. I pushed forward on the stick in an attempt to raise the nose. I couldn't get the stick forward far enough, and the distance above the ground was less now.

The missing raft had changed the altitude of the plane and taken five inches off my reach. This was the reason I couldn't keep the nose up. The runway was a blur and coming closer.

I had to do something and fast. I applied right stick and right rudder. The P-40 began to roll and was coming right side up, but the recovery was sloppy and the plane was slipping sideways. I was right side up but the plane was still slipping and the runway was coming closer. I felt the plane shudder and heard a ripping sound. The P-40 wrenched to the left and I almost lost my grip on the stick. With all my strength, I applied full right aileron and came back to level flight. Easing back on the stick, I started to climb out of there.

At 500 feet, I looked out at the left wing. About two feet was missing and this was causing me to hold full right aileron. Fearing that any minute the control wires might snap, I chopped the throttle and belly-landed in the Kuni grass. I learned later that I had hit a tripod the mechanics used to lift engines into P-40's—it was that close. END

the world looks up to an airman

Go Places Faster

in the U.S. Air Force

Take a good look at this man. He's going places—in a hurry. He's decided to get his future off to a flying start by enlisting as an Airman on the greatest young man's team in the world—the U. S. Air Force. He's all set for a life of sky-high adventure, plus the down-to-earth security that an Air Force career will give him. He's learning new skills, seeing new places, making new friends and working with men who appreciate his talents.

How would you look in Air Force Blue? Ask yourself this question and you'll see that the place for you is on the world's Number One fighting team. If you're between 17 and 35, you should see your local recruiter *today!*

STUDENTS! Graduate before you enlist!

Airman Information Branch F-8-F-2
Personnel Procurement Division, Box 2202
Wright-Patterson AFB, Dayton, Ohio

Please furnish me more information on my opportunity as an Airman in the U. S. Air Force.

Name_____ **Age**_____

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UNITED AIR LINES needs pilots and flight engineers

United Air Lines is growing and you can grow along with it. Expansion program involving a 65 million dollar aircraft order requires more pilots and flight engineers. You'll get excellent pay ($465 per month to start on assignment to line) opportunity for advancement, broad insurance program, retirement income plan and other benefits.

To Qualify: Age 21-28, 5'7" to 6'4", U. S. citizen, H. S. grad., commercial license with 165 hrs., pass flight physical with no waivers.

Applicants who also have Instrument Rating or Flight Engineer's Certificate (or Flight Engineer's examination written portion passed) will be accepted through age 29 . . . with both Instrument Rating and Flight Engineer's Certificate through age 30.

Successful applicants will attend United's Flight Training Center and receive a salary while training. Look to your future—apply now for both present and future employment.

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BLACK OR BROWN. Men's sizes 6-12, ABCDE, from stock. **$9.95.** (Sizes 12½-14, ABC, made to order. **$11.95**). Satisfaction guaranteed. **ORDER NOW.** Enclose check or money order.

WRITE FOR FREE CATALOG

TODD S, Dept. FY-7, 209 S. State St., Chicago 4, Ill.

Found: A $1500 Flivver

(Continued from page 26)

the wings, and the project got under way.

First, new glass was installed all around and overhead. This was followed by a new panel which included the primary instruments. Seat cushions were remade, using a green mohair cloth filled with foam rubber. To augment the 12-gallon nose tank, a CAA approved six-gallon tank was installed in the left wing. This amounted to an 18-gallon fuel capacity.

At this point, the 65 hp engine was removed and replaced with an 85 hp Continental. Likewise, the proper size propeller was installed on recommendation of the Piper Aircraft Company. The installation of the 85 hp engine added but seven pounds to the original 65 hp installation.

Then came the covering job. Rentz and Rufi used fresh Irish linen on the fuselage, wings and control surfaces. It went on smoothly and drew up to a firm, tight covering. Over the silver we sprayed five coats of color. The top of the fuselage and wings were made lemon yellow, while the lower half of the fuselage, leading edge of the wings and identification numbers were sprayed with Sacramento green.

After a short drying period, we assembled the airplane. As the components were brought together, we felt a tingle of excitement as the flivver began to materialize before us. We were straining at the bit by the time the weighing and relicensing were completed. The new weight and balance showed an empty weight of 748 pounds, and empty center of gravity 15.37 inches aft of the datum and a useful load of 472 pounds.

Soon the day came for the first flight. I crawled in, tested all controls through their normal range, and started the engine. The C-85 roared to life and I taxied into take-off position. The flivver felt solid, had positive control and was steady in the climb. Horizontal and directional stability, and slow flight characteristics were excellent. During the next few days I had good opportunity to feel out the flivver. Flying solo, I found the ship would become airborne in approximately 75 feet at maximum performance take-off. It will climb 1,100 feet a minute and cruise 90 mph at 2,200 rpm. In slow flight, I had good control at 50 mph.

With two persons aboard and full fuel load, the flivver will break ground in approximately 150 feet. It climbs 900 fpm, and will cruise at 85 mph with a power setting of 2,200 rpm. Slow flight minimum with two persons in the cabin is 55 mph. The flivver performs well at altitude too. During one flight, I had it up to 12,000 feet and it indicated ability to go higher. However, I was without oxygen equipment and called off the altitude check at that point.

In summing up the cost, our notes show the approximate expenditures:

Rundown 1947 *Cub*	$ 400
Recover job	500
Difference added to 65 hp for 85 hp engine	135
Wing tank	95
Color dopes, thinner, masking tape, etc.	50
Wheel skirts	15
New propeller	60
Low frequency dry battery receiver	15
Primary rate instruments	80
New windshield, skylight, etc.	75
Miscellaneous hardware, seat material, safety belts, switches	50
Licensing, including paper work, weighing, etc.	25
Total	$1500

END

WHERE AM I?

Scene of the annual Blessing of Aircraft, this airport is 2 miles SE of the city.

(Answer on page 80)

YOUR Quickest INTRODUCTION TO AVIATION

HIGH PAY SECURITY and a CAREER

There's romance and reward in the field of aviation. There's promise and fulfillment. There's the helping hand of an Embry-Riddle alumni of well over 50,000 men ever ready to greet and aid a fellow graduate. To be pointed out as an "Embry-Riddle man" is the open door to the start of a successful career—your introduction to the "right people"—your big step to HIGH PAY, ADVANCEMENT and SECURITY. As an accredited Embry-Riddle graduate you have *standing!* You are never an "outsider."

You can go places fast — depending on your training and abilities. You can have job security in good times and bad. There is no ceiling to advancement!

Aviation as a career is attracting America's finest young men, for its limitations are boundless as the stratosphere and its future is beyond the horizon. Your progress can be rapid, for there's no rule of "promotions come slowly" to handcuff ambitious spirits in the aviation industry.

Embry-Riddle International School of Aviation can prepare you for a choice of many job opportunities in the field of aviation, both on the ground and in the air. *Accelerated one-year courses eliminate non-essential study*...provide a rapid start to an interesting, well-paying career. Also 2-year and 4-year courses in cooperation with the University of Miami (leading to a BBA degree). Modern equipment including jet . . . live aircraft. Training under the personal supervision of a faculty of specialists.

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Print Name _____

Address _____

City _____

State _____ Age _____

I am a (check one) ☐ *veteran,* ☐ *non-veteran*

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960, Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

VOR-DME/TACAN COMPROMISE

The Air Coordinating Committee announced April 21 that its member agencies (main Government departments) had agreed unanimously on domestic and international programs for settling the VOR-DME/TACAN controversy.

Under the plan—reportedly agreed to by the military to forestall a joint Senate-House TACAN investigation—the CAA will continue VOR-DME until a succeeding system is installed on the Federal airways but, if TACAN is the succeeding system, VOR will continue until 1965 and DME to 1960.

Meanwhile, a minimum of TACAN necessary for tactical military requirements will be put into use with its integration on the airways being coordinated by policy yet to be developed by ACC.

The agreement provided further that the Air Navigation Development Board should (1) study and report to ACC on the radio frequency space needed for civil-military TACAN, and on TACAN's relationship to continental defense, (2) direct TACAN's technical development for possible "common system" use, and (3) make studies on a third direction and distance measuring system that meets "common system" requirements.

The compromise plan is very similar to the one originally suggested to ANDB by the CAA, AOPA, and NBAA (National Business Aircraft Association).

AIR-CHARGE IS HERE

AOPA recently proudly announced the inauguration of another AOPA aviation first—"Air Charge."

Now, for the first time, business executives, commercial operators, and family flyers can use AOPA Air-Charge credit cards to buy gasoline, oil and minor repairs up to $200 per purchase at more than 300 of the country's leading airports, then pay at the end of the month.

Air-Charge—the first step toward the long-discussed flyers' universal credit card—was born recently after two year's negotiation by AOPA brought about a contract with Trip-Charge, Inc., Pittsburgh, Pa. That company is a successful credit agency already serving busy auto and airline travelers.

Within three weeks after Air-Charge was proposed to airport servicing companies, more than 300 of them had endorsed it. Already, AOPA'ers can fly from border to border and from coast to coast and find plenty of Air-Charge fuel and repair stops en route.

The favorable acceptance indicates that Air-Charge may eventually extend to most of the country's airports. It is hoped that Air-Charge will be so successful that it can later be expanded to cover other traveling items like hotels, meals, and local transportation.

Under the plan, AOPA issues an Air-Charge credit card and a list of operators who honor it to each AOPA member. The member can use it to make convenient charge purchases and pay for them at the end of the month, making his personal air travel easier and faster, and his accounting and expense recording tasks simpler.

ANOTHER AOPA "FIRST"

AOPA Safety Service—just inaugurated on a regular basis by AOPA—makes it possible now, for the first time in civil aviation history, to deliver every CAA Airworthiness Directive immediately to the owner of every plane affected.

Last year AOPA made a careful check and found that there was no practical way to get AD Notes (as the directives are sometimes called) into the hands of all airplane owners concerned, although the CAA and product manufacturers do their best to supply all maintenance organizations, distributors, and dealers they happen to have listed with notification of such vital changes.

Believing that its IBM facilities offered the only solution to the problem, AOPA tried Safety Service experimentally, sending the mandatory bulletins to more than 30,000 plane owners, asking for their comments. Response was so overwhelmingly favorable that Safety Service has been made a permanent AOPA feature.

Now, whether he is an AOPA member or not, every airplane owner of record in the U.S. can be sure that he will know about any mandatory directives affecting his plane almost before the CAA ink is dry

MEMBERSHIP CONTEST

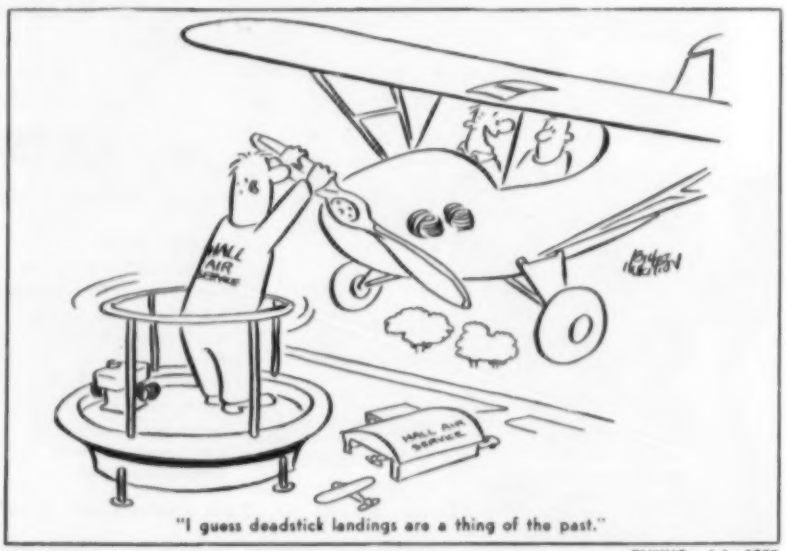
"Let's Go For Double" is the slogan of AOPA's king-sized membership contest which got under way April 1, and will continue until July 31. The object—double AOPA's 42,000 membership, thereby doubling the effectiveness of AOPA's objectives to make flying safer, less expensive, and more useful.

Announcing the contest, Joseph B. Hartranft, Jr., AOPA president, said:

"Everyone wins in this contest—individual members, AOPA, and all private aviation.

"Individual member prizes range from the popular plastic AOPA credential case with its 27 card windows (for one new member) to the $87.50 AOPA NAVITIMER, famous computer-chronograph (for 30 members). And for the AOPA'er who brings in the most new members there's the grand-prize six-day free cruise to Bermuda as a guest of AOPA's Eighth Annual Round-up.

"With a larger membership, member service can be expanded, AOPA's long-range programs can be expedited sooner, and AOPA will be an even more potent force than it already is in civil aviation progress."



"I guess deadstick landings are a thing of the past."

Elmira

(Continued from page 37)

tenth contest, he encouraged the first American flights within cumulus clouds and thus another chapter was written on the source of energy that can be used by soaring pilots.

With the gain of meteorological knowledge, the flights improved over the years; from a best distance of 21 miles in 1930 to John Robinson's 290 miles in 1940; to Dick Johnson's 1951 flight from Elmira to Norfolk, Va., 376 miles. This progress is due also to improvement of sailplane design. During the early contests, a glide ratio of 18-1 was considered good. Johnson's RJ-5 has a glide ratio of 40-1, meaning that, if he is a mile high, he can glide 40 miles without additional upcurrents.

The contest in 1941 was the last until '46. In June, '41, the Army Air Force sent a class of six pilots to Elmira. A month previous, the Germans had captured Crete with parachuted and glider-landed infantry, and the small class at Elmira was the start of this country's glider training program. In subsequent war years, hundreds of glider pilots were trained by the EASC under contract with the Army Air Force.

In postwar contests of 1946 and '48, the Army put on an exhibit of cargo and troop carrying gliders, similar to those used in the airborne invasion of Normandy.

You have learned about these contests from several of the pilots and officials. One may have been Paul or Ernie Schweizer who own the Schweizer Aircraft Corporation at Chemung County Airport, this country's only active glider manufacturer.

It's now the first day of the contest. The pilots' meeting is held in the administration building after breakfast, and it is there that contestants are briefed on the weather and the task for the day. They may decide on "free distance" where a pilot tries to fly as far as he can in some direction he chooses; or elects to try for a fixed goal or to soar around a triangular course. Points are given for distance and sometimes a bonus for speed. Today the committee has decided on the triangular course.

Pilots and their crews prepare their sailplanes for take-off. You relax in the sun and watch the proceedings, knowing that, when a pilot is going over a map with his crew, he should not be interrupted, anymore than you would interrupt a football huddle during a game.

In little more than an hour, all contestants have taken off. The triangular course is 70 miles and a pilot may fly around the course as many times as he is able. A few large sheets are put in a corner of the field in different patterns. The pattern is changed every 15 minutes, here and at the two other turning points. When the pilot circles the field, he records the time and notes the design. This information is later given to contest officials for checking.

In the afternoon a spot landing contest is held. The distance from the marker

(Continued on page 66)

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(Continued from page 65)

is measured in inches, not feet. If the sailplane is more than ten inches from the spot, the pilot better go for another try.

Glider accuracy in spot landings sounds quite impressive; looks even better. It is really quite simple. Sailplanes are equipped with spoilers, a plate on the wing which can be raised and lowered by the pilot at will. This plate kills part of the lift with the result that, instead of the sailplane sinking three feet a second at 50 knots, it can sink six or eight feet a second with the same speed. As a pilot comes to final approach, he raises his spoilers to a half opened position. If he finds he is too high, he then uses full spoilers; if he finds he is too low, he closes them. Spoilers are to the sailplane pilot what a throttle is to a power pilot. And another factor: the distance from the marker is measured from the spot where the glider comes to rest, not where he touches down.

Most sailplanes are equipped with brakes on their single wheel; all have metal skids in front of the wheel. After one touches down, if moving too fast, the pilot applies brakes and pushes the stick forward so that the skid digs into the ground. Such devices are quite necessary for cross-country landings.

A glider pilot generally picks an airport as his goal but it is only on exceptionally good soaring days that he can guarantee landing at his destination. Chances are that, after gliding from his last thermal climb, he will have to choose the most likely looking pasture within gliding range. The field can be less than half the size of that required for landing a *Cub*. But the sailplane has an advantage. He doesn't have to take off from the field. His ground crew arrive with the trailer, the ship is dismantled and put on the trailer in about 20 minutes and they're away.

The pilot's crew are as much a factor in his success as is his flying ability and judgment. Soaring is not a completely individual sport. Before each flight the pilot goes over plans with his crew, which usually consists of a crew chief and one or two helpers. Time of take-off, direction of flight, distance, and estimated time of landing are discussed. After take-off, the crew waits until they see their pilot has caught a thermal and left the vicinity of the hill. Then they start out in the designated direction. After a few hours, they call back to Elmira to see if word has been received from the pilot. If not, they drive on, phoning to contest headquarters intermittently. Weather conditions, as usual, are liable to change from those anticipated before the flight. Chances for thermals straight ahead might look poor while a good line of cumulus clouds may stretch in another direction. The pilot may alter his original destination to take advantage of this situation. It is the crew of the successful team which will also make the same decision on the ground after spotting the cumulus.

The obvious answer is for all sailplanes to have two-way radio. Each year more and more teams come equipped with radio, but the majority still depend on their judgment. After the pilot lands, he calls headquarters, giving time and place of landing. His crew receive this information the next time they phone in. They are usually within a 50 mile radius of the landing point on a 200 mile flight, but occasionally a crew is waiting on a field for its pilot to land.

Contest points are given for airline distance the pilot has flown and his total points are generally made up of his six best flights in a ten day contest. In earlier years, points were also given for altitude and duration; but this was prior to the advent of present high performance designs and before soaring meteorology was well known. END

"Some thermal, eh?"

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I Was Their Scribe

(Continued from page 30)

getting away at the first glimmer of light, battled his way through gusts so heavy that some of them almost catapulted him from his seat. Paulhan won the £10,000, but told me later he would not repeat such an ordeal for "ten times ten thousand."

One of the most intriguing figures in early flying was quaint little Brazilian millionaire, Alberto Santos-Dumont. Coming to Paris, he spent a fortune in the construction of a series of small airships, being the first man in history to establish a regular aviation plant.

Flying above Paris one day in a tiny one-man dirigible, driven by an engine developing only three hp, little Alberto cracked up on the roof of a leading hotel. The gas in the airship exploded with a bang, and people looking up from the streets reckoned Alberto had met his end. To everybody's astonishment, however, he was seen clambering from the roof and swinging perilously from a gutter-pipe, to wriggle into an open window.

One day, when I was talking with Santos-Dumont in Paris, I remember asking him where he and other air pioneers found the courage to risk their lives constantly in the way they did. With one of his whimsical smiles the little man replied: "Do not think, my friend, that we are all so very brave. It is simply that we forget the hazard. When one has created something, he is so interested to see how it will work that he does not think about himself at all."

One of the most picturesque figures flying has known was that amazing American, Col. Frank S. Cody. When he first came to England to interest the military in his man-lifting kites for scouting purposes, he made his headquarters in a workshop out on Laffan's Plain, near Aldershot. It was here that I spent many a fascinating day with him. His whole outfit on the Plain was just what one might have expected in some Wild West film. Cody himself would gallop across the Plain on a big white horse, wearing long thigh boots and waving a wide-brimmed, black hat. A team of his man-lifting kites, flown one above another, could lift a man seated in a small balloon-type basket to a height of 1,000 or 1,500 feet. One day Cody sent his wife up in the basket, and, going back into his shed to work on something interesting, forgot all about her up there until he heard her demanding to be pulled down.

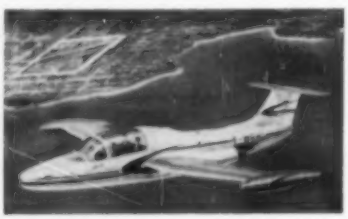
Cody told me how, as a youth, he had been wounded by marauding Indians. At one time he joined a buffalo-hunting crew, and met a Chinese cook whose hobby was building and flying large kites. This started Cody in the kite game. From kites he went on to small airships and then to aeroplanes—the latter of which he always called "power-kites".

This big, bearded, laughing man was a born engineer. He would rough out a design for a new aeroplane with a piece of chalk on the wall of his shed. If he liked the look of it, he would then proceed to build it. And not only to build it but also fly it himself. He tempted Fate so often that friends begged him to stay on the ground. But there was no arguing with this redoubtable man and one day, in an experimental machine he was testing, something went wrong and he crashed to his death.

To those of us who lived the first years of aviation there is one name, always, that stands out on the roll of pioneers. It is that of Otto Lilienthal. The real-life story of Otto and his brother Gustave is more like fiction than fact. As schoolboys in Germany they had been fascinated by watching the young storks flap their wings and run forward into the wind; the storks had to learn to balance themselves in the air, and endured many falls before they became really proficient flyers.

Why should not they themselves learn this art of aerial balance, like the birds, the boys asked themselves? If they built light wings, covered them with feathers, and ran down a hill facing into wind, could not they extend these wings and soar through the air? Their mother, a widow, had none too much money to spare, but willingly provided the boys with the money they needed to build their gliding machines. To avoid ridicule, they took their frameworks of wings out at night, and began to skim down hillsides in the moonlight. Often they fell, like the young birds but did not hurt themselves. The early experiments were never forgotten by Otto.

Later on, he and Gustave built many more gliding machines, and eventually Otto, now established as an engineering consultant, had constructed for himself a special gliding hill, on the top of which was a chamber in which he housed his winged machines.



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Hundreds of glides Otto made down this artificial hill, and before long was able to do something no man in the world had done before. By swinging his body and legs below the bird-like framework of wings on his shoulders, he began to learn those movements necessary to maintain balance even when gliding in high and gusty winds. His skill became in time so great that he could hang motionless against the wind.

Presently he began to build larger gliders, in order to increase the length of his flights. But one day, in a treacherous and gusty wind, he stalled out and sustained fatal injuries.

Otto had always in mind the idea of eventually fitting a motor to one of his gliders. This ambition he never realized, but a book he wrote so inspired Wilbur and Orville Wright that they carried on the research from the point where he left off, and succeeded in reaching the goal that had eluded him.

For the privilege of having worked with them all, and written of their triumphs and failures I have never ceased to be grateful END

I Learned About Flying From That!

(Continued from page 46)

located it. One glance and I knew I was right. It was far too small. The course was located in a natural "bowl" completely surrounded by hills four to six hundred feet high on all sides. Only a helicopter could possibly land here. Certainly a J-3 Cub could not.

Telling my passenger I would land him at a neighboring town at no extra cost, I thought everything was fine. I was wrong. He wanted to land at Clayton and no place else. To show him it was impossible, I told him that I would "drag" the golf course at a low altitude.

I chose the approach that seemed best for getting in and out of the "bowl," throttled back and started gliding in. I waited until the last minute to advance throttle in order to show my passenger that we could not land. By waiting, I almost made a fatal mistake. As I advanced the throttle the engine "revved" up to 1,200 rpm, and started dying away. Then I knew—my old enemy, "carburetor ice," was also a passenger on this trip. This time I couldn't execute a 180-degree turn due to the fact that mountains were on both sides of me. This was also true straight ahead. Realizing a crash was inevitable, I dropped the nose of the ship, hoping to gain a little speed and pull up over the ridge. Regardless of what was on the other side, it would be no worse than the spot I was in. As I brought the nose up, the plane stalled and an instant later started a spin to the left.

When I awoke, battered and bruised, three hours later, I realized that I wasn't as lucky with my encounter with carburetor ice this time as I had been several years before. Neither my passenger nor myself were seriously injured but my plane was a total loss.

One primary thing I learned. Never let an unqualified person interfere with a decision you think is sound. END

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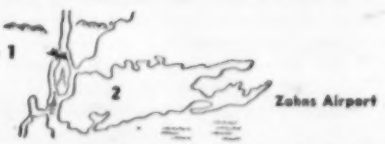

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Swell Joe's

(Continued from page 44)

interest of better self-preparation for aviation pedagogy.

Of course, from an over-all standpoint, this bit of spontaneous, hastily organized, flight instruction was but an extra plum in the whole fruitcake of the workshop. After a month of intensive rubbing of shoulders with a long train of experts from every phase of aviation who came to lecture or demonstrate techniques or teach special classes, the teachers were handling the lingo of the air as casually as a jet ace. Sorties to wind-tunnel facilities, industrial plants, weather stations, control towers, military bases and other pertinent points, lent flavor to the solid class-room sessions.

Another phase of activity which impressed the teachers was that the workshop actually used the air to carry out its details. Speakers all flew in to Boulder. Staff members hopped to Denver or Cheyenne or Laramie or up to Minneapolis or down to San Antonio for class room materials. The Boulder airport was literally a workshop parking lot rather than a remote place where a few fanatics held forth in derring-do.

With real justification, the leaders of aviation in the United States have always taken a special interest in education and in the public school teacher. Knowing that the national consciousness of air age potential would largely determine the future of the American way of life, the airman has foreseen that the teaching corps is the key to that consciousness. Therefore it was natural that the aviators at Boulder were enthusiastic about the continuing success of the workshop program.

The deepest satisfaction, however, came from the evaluation of the project as a sound pedagogical contribution to the American public school system. Visitor after visitor at Boulder . . educators, editors and publishers, industrialists et al. . . . after inspection of the program, rated the workshop as a notable addition to the science of education, as well as of aviation. Perhaps this might have been taken for granted by some of us because of the top leadership we had . . . men such as Dr. Spaulding, Dr. Strickler, Dr. Andrew Holt, Dr. John Furbay and others . . . but even they have long been distinguished for their vision airwise, and probably we think of them more as airmen than as educators. Therefore it was good to have a broad cross section of dispassionate evaluation from outside interests.

As this is written, plans for extension of the aviation workshop idea are going forward in various sections of the country and at numerous universities. Most distant of these is the 1955 workshop to be inaugurated at the University of Hawaii, where Dr. Spaulding will be the Director. Thus swiftly the pattern is spreading and growing in volume.

The Civil Air Patrol has had its headaches and ups and downs over the years, succeeding locally where good leadership was available and falling flat where it was not. But of all lines of endeavor it

has followed . . . cadet training, international cadet exchange, search and rescue, participation in continental defense plans . . . I would judge that the workshop programs organized to give the public school teacher an insight to the air age, will have the most far reaching effect.

And incidentally, if the school teacher has discovered us air folk to have our feet on the ground, let it also be said that in these workshop programs we have discovered the school teacher in a happier light than many of us supposed . . . capable of spontaneous determination to take a shot at learning to fly . . . capable of wanting to see what is over the hill . . . and, oh well, I might as well say it as inelegantly as I would to another pilot on the flight line, "They're a bunch of swell Joe's." END

The RAF Today

(Continued from page 40)

carriers. Then came the "1052", of which only three were built. Wings were swept back but tail remained straight. A similar engine powered them and these first flew in 1949. The design experience led to the "1081" in 1950 with both wings and tail swept back. These were all only developed, however, as experimental types but they led to the "1067"—first flown in November 1951. This was the first *Hunter*—seen at the Farnborough Display in 1952, that vintage year when so much of the postwar designing brought prototypes to the flying stage.

The *Hunter* I is already in service in four RAF Squadrons and two more are forming. The *Hunter* I is powered with the Rolls-Royce 8,200 lbs. thrust *Avon* engine. After the first batch of 100, the next version to be delivered to the RAF will be the *Hunter Mark IV* and some of these will reach the RAF later in 1955. The same motor is employed but the *Hunter IV* will be fitted with air-to-air guided missiles. The *Hunter III* and *Hunter V* are fitted with *Sapphire* engines for experiments. The *Hunter III* set up a world speed record when Neville Duke—Hawker's Test Pilot—achieved 751 mph with re-heat. But such is progress that re-heat is now out, and no more *Hunter III* types will be built.

The last in the series is the *Hunter VI* which will be slightly longer and take a slightly larger *Avon* developing at least 10,000 lbs. thrust. It too will take the guided missile. This is the *Mark* which will be built in great numbers and NATO forces are to have 400 of either the *Mark IV* or *Mark VI*.

The Ministry of Supply is now deciding which of several air-to-air missiles the *Hunter* will be given. Several thousand rockets and missiles have been fired at the Woomera Rocket Range, South Australia, so Britain is not too far behind America in firing experience. Presently, Hawker is building a two-seater trainer version. Two big problems beset the firm; the fitting of a dive brake—not in the original specification; and that of developing the plane into a steady platform

(Continued on page 72)

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(Continued from page 71)

for firing when moving in the region of the sound barrier. The *Hunter* has emerged firing at 40,000 feet, completed satisfactorily; and tests to 50,000 feet are not expected to provide difficulties.

At the time of writing, the *Swift* is still undergoing evaluation tests. It may be scrapped in the meantime. It is causing the Air Ministry to take another look at a "Private Venture" aircraft—as we call those designed to a manufacturer's own specifications—the *Gnat*. Based philosophically on the Japanese technique, in which structure, weight and equipment are sacrificed for cheapness and maneuverability, the *Gnat* is built by the Folland Aircraft Company. It is a light fighter and will be powered with a Bristol *Orpheus* jet which has already been running for some months. A medium-thrust jet, it will enable the first *Gnat* to fly this spring. Its forerunner, the experimental light-weight *Midge*, with only a third of the *Gnat's* power, has dived through the sonic barrier many times.

The Air Ministry is considering an order of 20 *Gnats* for experiment, and may try out the theory of the cheap-to-make utility fighter devoid of trimmings. Recent delays with all new aircraft has caused the Air Ministry to abandon the old tight-fisted policy of ordering two prototypes of a new model. Often one was lost in the first year of tests and a year was thus lost waiting for Number 3. Full evaluation took longer and was costlier in the end. The U.S. practice of ordering up to 20 prototypes is now being adopted in the case of complicated aircraft. This will enable evaluation to be dispersed over many types with much quicker completion of all prototype tests; and the RAF will receive its aircraft all the sooner.

Whether a production order for the *Gnat* will ensue must depend upon the Air Ministry's concept of how enemy attack will be launched. If the enemy should take advantage of darkness or bad visibility then the larger, heavier, all-weather radar fighter must be relied on for interception. The *Gnat* is too small to carry radar equipment. But day interceptors, operating in clear weather, would be required as insurance. It is here that the featherweight *Gnat* as a day interceptor might possess a role. Certainly, when used as a fighter, it can reach 50,000 feet; carry two 30 mm cannon; and in the fighter/bomber role can carry 12 air-to-ground rockets or two 500-lb bombs—no mean armament for a light weight Fighter.

Behind *Hunter*, *Swift* and *Gnat* is the English Electric P2—Britain's first true supersonic Fighter. Built by the firm which developed the successful *Canberra* light bomber, the P2 has already flown. Whereas *Hunter* and *Swift* can pass through the sonic barrier with a 20 degree dive and were not designed as true supersonic fighters, the P2 designed in 1950, certainly is, and passes Mach 1 with ease in level flight. It may be 1958, however, before it can reach the RAF as a successor to the first postwar Fighters.

Nor must I forget to mention our night Interceptor, the Gloster *Javelin*, a 650 mph plane with radar equipment. The first few have been lost without all causes ascertained as yet. To this extent our night protection is still weak but, if past experience is any guide, the *Javelin*, a delta-winged two-seater, should pass through its teething troubles in 1955 and reach the Royal Air Force in 1956—much later than hoped, but no great harm done provided Britain is not previously under attack.

The new streamlined RAF will possess also a version of the Vickers *Valiant* developed as a long range military transport. The transport probably will fly at the SBAC Display in September of this year, and ought to be available for the RAF by 1957. As a 100-seater, cruising at 600 mph, it will enable the RAF to cope with the needs for troop movement.

Decision has already been taken to abandon sea transport for army trooping. Air Transport has proved cheaper and soldiers, instead of being out of circulation for two months when trooping to the Far East, will be at operational bases or in battle line within 12 to 24 hours of leaving U.K. It will probably be 1960 before the RAF possesses a large air transport fleet and is able to end its present system of "priorities" for travel.

HELP!

The editors of FLYING would like to be able to pass on to air touring pilots information about motel accommodations at—or very near—airports throughout the United States. We will very much appreciate hearing from any pilot who knows of any such motel. Just drop us a card with the name and location of the airport, type of accommodation available, and any comment you care to make.

The RAF is to possess also a fleet of 200 mph Blackburn *Beverly* freight planes, capable of lifting really great loads and of using short grass runways. First squadron should be formed this year.

There remains the helicopter to consider. Designs for the 40-seater have been sent to various interested firms. Manufacturers, including the Bristol Aeroplane Company and the Fairey Aviation Company, as well as Saunders-Roe, are engaged upon them. Bristol has already developed the 4/5 seater *Sycamore* as an advanced design over the S 51, and first squadrons are now in Malaya. So are the first British-built S-55's—under construction by Westland Aircraft Company Yeovil—who are to build the larger Sikorsky *Hoverplane*.

The British Army looks to the helicopter to replace the three-ton truck and all movements to battle areas are to become helicopter convoys on the assumption that nuclear warfare would make roads and bridges impassable. The Army wants a 40/50 seater—something which

can lift the same load as the five ton truck. These designs are unlikely to reach flying stage for four years; and it may well be 1964 before the RAF and Army secure large numbers of the right kind of helicopters for short range hauls. But the concept is there and the principle has been adopted.

The Flying Boat is in the doldrums for the RAF, and the old Short *Sunderland* four-engined boat, beefed up in 1941, will still be seen in waters between Singapore and Hong Kong and in other areas round Malta until at least 1960. The flying boat comes at the tail end of rearmament and, although Saunders-Roe have developed the ten-engined *Princess* Class, and three have been built, they have been cocooned. Designed to fly at 380 mph with 100 passengers and 5,000 miles range, they were to be powered by Bristol *Theseus III* propjet engines. So far flying at 250 mph, they have undergone satisfactory tests with *Theseus II* propjets. But the *Theseus III* has not been given a high priority for manufacture and the RAF is now looking to development of Bristol jets of which six instead of ten will form the power plant. This involves re-design of the wing which was built for four coupled engines.

A decision that the RAF is the Service of first line defense of the United Kingdom—replacing the historic Royal Navy whose vigilance from the days of its "wooden walls" for 800 years has kept Britain inviolate—has already been taken. The air-to-air guided missiles go to the Royal Air Force. As this Service will be responsible for defense of Britain against air attack and invasion, the ground-to-air missiles also come under its control. The Anti-aircraft Command is being dissolved, as ack-ack is now outmoded.

Yet the Royal Air Force has its moments of nervousness. Development of the guided missile might in 15 years put the manned bomber out of business. We may be witnessing in the U.S. models and these British jet bombers, the last concept of the piloted fortresses. They will have earned their salt if still in service from 1955 to 1970.

With them might go the manned interceptor, though as a platform for air-to-air guided missiles, its future is a little rosier. If Bomber and Fighter Commands go, what is left? The Royal Navy is fighting to secure Control of Coastal Command on the supposition that all offshore protection is its role, whether operated from carriers or from ashore, and that all anti-submarine duties belong to them. That might leave only a Transport Command and there are schools of thought which would turn this job over to commercial airlines.

However, while these concepts may have application for large scale warfare as we visualize it from British and European bases, they may not be so valid in the case of the innumerable small wars in out-of-the-way areas of the world. And it is these and not the World War III concept in which we may be engaged. In such case, highly mobile fighter and bomber forces will still have their role to play. END

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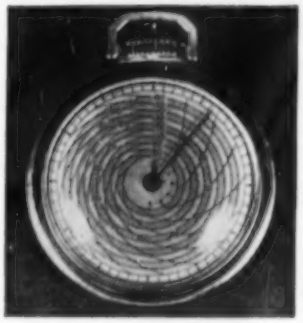

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(Continued from page 23)

miles from the heart of San Diego but a world apart otherwise. Courteous officials move you through the usual red tape in a minimum of time. The airport is modern and used by the country's major airlines. Runways are long and in excellent shape.

Now, as you climb off the Tijuana airport and head south again, you will appreciate the meaning of the pilot's certificate in your pocket. For this land is not dotted with emergency strips, nor does it sport a beacon light on every hill. Strips are at a minimum and good facilities are rare. Still this is a pilot's land. For the romance of the air fits nicely into the mood of this country.

Ahead of us lay a light stratus bank while, beneath us, the tilled countryside bathed in warm sunlight. From Tijuana to our first stop at a place called Hamilton's Ranch, we could look forward to well over a hundred miles of hard packed beaches, should we be forced down. Inland, between the hills and the jumble of mountains, there is plenty of flat, accessible land.

Angling slightly southeast from Ensenada, and flying at 2,500 feet, we soon came in sight of the strip at Hamilton's Ranch. This stop would mark the end of a truly modern area and entry into the desolation that marks so much of this countryside. At Hamilton's we had red carpet treatment with an excellent "brunch". The strip is 2,200 feet long, running southwest-northeast. It is well gravelled and the approaches are not too tough. Fuel is always available.

From "Ham's Ranch," we pointed the *Navion* toward San Quintin Bay. Our original destination had been La Paz, long famed for its wonderful fishing but a few days before we had been told of a new fishing lodge south of La Paz, designed particularly for the lightplane pilot —a place called Rancho Buena Vista run by an ex-TWA Captain. Here also the marlin and the sailfish were reputed to climb into your boat in their efforts to be caught. This was for us! Naturally Buena Vista became our destination.

If you are a poor navigator, you need not allow it to spoil this trip. Nature has collaborated with you and put the entire Pacific Ocean on your right, while man has placed a road straight down the center of the peninsula. Incidentally, Baja is no more than an hour and ten minute flight across at its broadest point. So one has no business getting lost.

With the air calm and the outside temperature at 71 degrees, we headed over the lush shores of San Quintin Bay. Nature has few lovelier sights but only a man in an airplane can hope to really see San Quintin Bay.

From here we climbed slowly, heading for Los Angeles Bay, on the opposite side of the peninsula. Though we did not land there, we marked it down in our books for a future stopover. Here, there is a 2,500 foot strip with a one way approach over a hill. Fuel, food and drink are available.

Pilots familiar with this area had advised us that, after leaving Los Angeles

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Bay, we would find our navigation a simple matter of following the coastline. For the photographers in our group, we altered our course inland slightly as we headed for Santa Rosalia to photograph the country's famous, but extinct, volcanos. Called the "Three Virgins," the triple peaks present an unmistakable landmark.

On this leg of the trip we found time to chase a pack of coyotes over the crest of a hill, after which we dipped down to look at a group of coastwise islands.

Passing over picturesque Santa Rosalia, we marked a landing strip carved out of the side of a hill. It looked to be more than long enough and we learned later that DC-3's of Mexico's Trans Mar de Cortez use the strip daily.

For the lightplane pilot, Baja offers a steady series of easily identifiable landmarks and our earlier fears of navigation and problems abated as the trip progressed. Nevertheless desolation was rampant, and a pilot with a camera and an eye for the topographical unusual can come up with a fine set of aerial photos. Weather too in this area is constantly good. An occasional stratus bank prevails as you leave San Diego along the coast but contact weather is the rule.

Southward the land rises, becoming somewhat reminiscent of the lower Sierra Nevada ranges. Dotted here and there throughout the length of the peninsula are small strips whose condition we did not trouble to ascertain. These abandoned strips are said to be the work of smugglers who find a lucrative trade in the lobster haul across the border.

Five hours after leaving San Diego, we passed over La Paz, circling the harbor once and continuing on to Rancho Buena Vista. Thirty more minutes found us over the beach off the end of the hard-rolled strip that marked the end of our journey. The approach over the water was simple as the strip was well defined.

We were met on landing by a Mexican boy in a car who directed us to a tie-down area. At Buena Vista we found the natural end to our lengthy flight in the cool drinks and effervescent hospitality. Herb Tansey, the owner, was on hand to see that we got off on the right foot, and to aid us in the choice of boat and crew for our fishing. Turtle steaks, lobster, venison, and ham and eggs were features of the evening menu.

We found too, that within a short flight from Buena Vista, are many interesting side trips easily accessible to a lightplane. Though we had expected to suffer financially any time we put our plane on the ground in Mexico, we were agreeably surprised at the reasonable rates. Most importantly we found that our plane was well protected and the gas boy knew how to handle the ship.

As to the fishing, we found almost within sight of our quarters the perfect answer to the eternal question confronting the lightplane pilot, "Where to next?"

Only a lightplane could have taken four people almost 900 miles into Mexico and back for less than 50 dollars worth of gas and oil. For the lightplane pilot I can happily advise, go south, for this is truly a private pilot's dream trip! END

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FLYING CALENDAR

June 18-25—Third Annual JayCee Trans-Continental Air Cruise, Palm Springs, Calif., to Philadelphia, Pa. Contact Phila. Jr. Ch. of Commerce, 17th & Sansom St., Philadelphia 3, Pa.

June 19—Spring Air Show at Warren Cy. Airport, Glens Falls, N. Y., sponsored by Glens Falls Ch. of Com. and the Flying Twenty Club, Inc., John Johnson, pres. and ch. of arrangements com. Rain date: June 26.

June 26—Second Annual Ranch-Style Flying Breakfast, Bluffton Airport, Bluffton, Ohio, sponsored by Bluffton Flying Club and Bluffton Business Men's Ass'n.

July 2-6—Ninth Annual All-Woman Transcontinental Air Race, Long Beach, Calif. to Westfield, Mass. Contact Mrs. Betty H. Gillies, Chairman, at Box 5336, East San Diego, Calif. for details.

July 2-14—National Soaring Contest, Elmira, N. Y. This is 25th anniversary of the National soaring meets and also of all soaring at Elmira.

July 3—Aledo Centennial Celebration fly-in breakfast, Mercer Cy. Airport, 2½ miles north of Aledo, Ill. Sponsored by Aledo Centennial Assn. Cash prizes.

July 3—Second Western New York Air Show and Races featuring midget airplane closed racing at Dansville, N. Y. Contact R. W. Neunes, Rochester Pilots Assn., Rochester Airport, Rochester, N. Y.

July 3—Montevideo Breakfast Flight, to be held in conjunction with Montevideo (Minn.) Fiesta Days celebration.

July 4—Dawn Patrol Flight. Clinton Woolsey Memorial Airport, Northport, Mich. Boating, golf, prizes.

July 17—Breakfast Flight, Ellensburg, Washington.

July 24—Fly-in-breakfast sponsored by the Pottstown Unit, AOPA at Pottstown Airport, Limerick, Pa. Unicom in operation—122.8. Rain date, July 31.

July 24—Greater Cincinnati Airmen's Sixth Annual Trophy Race. Beautiful trophies, buffet lunch and entertainment. For entry blanks write: Greater Cincinnati Airmen's Club, 2d Fl., Adm. Bldg., Lunken Airport, Cincinnati 26, Ohio.

July 30-31—Seattle AOPA Flight, Alpine, Wyo. Flying Saddle Klinger Lodge.

Aug. 5-7—Annual Fly-in of Experimental Aircraft Assn. Curtiss-Wright Airport, Milwaukee, Wis. Contact Paul H. Poberezny, 3801 S. 56th St., Milwaukee 14, Wis.

Aug. 14—Pacific City, Wash., Fish Fry.

Aug. 14—Flying Fish Breakfast, Livingston, Mont. Catch the Big Trout and win $1,000. Spot Landing contest. Write James P. McGuire, Montana Pilots Assn., P. O. Box 662, Livingston.

Aug. 15-20—National Flying Farmer Convention, East Lansing, Mich.

Aug. 20—Fourth Quarter of Britain's National Air Show featuring the King's Cup Race. Contact the Royal Aero Club, 119 Picadilly London W 1, England, or Civil Air Attache's Office, British Embassy, Washington, D. C.

Aug. 27-28—Seattle AOPA Flight to Red's Wallowa Horse Ranch.

Sept. 3, 4, 5, 6—Seattle AOPA flight to Reno, Nev.

Sept. 17-18—Seattle AOPA Flight to Powell River, Kamloops, B. C.

Sept. 18—Walla Walla (Wash.) Chamber of Commerce Air Fair.

Sept. 30-Oct. 2—Flying Farmers Regional Convention at Yakima, Wash.

Oct. 1-7—National Flying Clubs of America's First Annual Meeting, Seattle, Wash.

Oct. 18—7th Annual Aerial Spraying and Dusting Conference, Wenatchee, Wash.

Calendar items must be received at FLYING's editorial offices, 366 Madison Ave., New York 17, N. Y., three months prior to the event.

Look Out for Wind Gradients

(Continued from page 31)

ient, the ship may be flown slower and at a higher angle of attack whereas downwind the speed must be increased and the nose put down. It has been shown that this difference in angle may be as high as six degrees under ordinary circumstances and may be much more. This is very important to keep in mind. A ship may be flying upwind very safely with the nose three degrees above normal, whereas downwind the nose should be three degrees below normal for the same degree of controllability."

There is another effect of a wind gradient that is very important in low level flying. The necessity for using steep climbs to clear obstructions causes the

airplane to pass through wind changes rapidly. Climbing steeply into increasing headwinds, the airspeed does not drop off as rapidly. Conversely, climbing downwind the increasing tailwind causes loss of airspeed at a more rapid rate than in the same climb when there is no wind gradient and the plane must be leveled off at a lower altitude to avoid stalling. Rapid changes of altitude in a wind gradient are comparable to a sudden change in wind velocity. This effect, plus the necessity for more airspeed due to loss of lift, seriously reduces the ability of a heavily loaded airplane to climb safely over obstacles when flying downwind in a wind gradient. Climbing upwind, however, the altitude gained in a steep climb is increased appreciably and often is over twice the altitude possible climbing downwind.

You might ask why it is that sometimes there are dangerous wind gradients, how frequent are they, and what is the cause for the extreme conditions described previously. They are not an everyday occurrence. I have seen a very few days, in five seasons of dusting and spraying, when there was a bad wind gradient. Perhaps this infrequent occurrence of serious conditions explains the lack of attention they have received. Another factor is the lack of obvious signs that accompany the worst conditions.

A recent translation of a German book on agricultural meteorology, "The Climate Near the Ground" by R. Geiger, Harvard University Press 1950, devotes several pages to wind gradients and establishes what appears to be a direct relation between wind gradients and temperature gradients.

The set of conditions most conducive to extreme wind gradients seems to be: 1. A strong wind aloft. 2. A humdinger of a temperature inversion. These criteria fit neatly with the situation that seemed in vogue every time I ran across a dandy wind gradient. The weather generally had been cool and cloudy with some rain, so that the ground was relatively cool. This was followed by strong warm winds and clear skies. The clear sky and relatively cool ground allowed a temperature inversion to form just at dusk. The wind gradually dropped to a dead calm at dark and began rising shortly after sunrise as the sun burned away the temperature inversion.

My first initiation was under these conditions just before sunset. The near calm at ground level influenced me to dust a corn field both upwind and downwind. I wanted to avoid flying across the rows into the sun and climbing over a telephone line on the west edge of the field. After flying south, into the wind, to check the phone line for extraneous brace cable, I climbed up, turned around and made my first dusting pass adjacent to the phone line *downwind*. The only obstruction north of the field was a small grove one fourth of a mile away so the only important obstruction seemed to be the phone line off my left wing.

I got above the wires on my climb out of the field but began wobbling on the edge of a stall at only 50 feet altitude. The grove was not very high nor very

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BACKYARD AIRSTRIP

WHERE THERE'S a will, there's a way. Jack and Mildred Snyder have a little home near Westfield, Ind., some 20 miles north of Indianapolis, where Jack is a mech for Indiana Bell Telephone.

Both the Snyders are pilots and they owned an Aeronca *Champ* which they formerly kept at Sheridan Airport, a good 15 miles from Westfield. Both time and money were scarce and it looked as though the *Champ* would have to go.

Back of their house was a five-acre pasture . . . not very big but Jack started pacing it off. He found he could get a 1,300-foot strip of 150-foot width out of it. Could the pasture be rented? It could.

The Snyders hoed off a few bumps, rolled it out a bit and brought the *Champ* home. Then they got some old lumber and built a "T" hangar. They began to have fun that fitted the old pocketbook. A couple of neighbors got intrigued with the fun Jack and Mildred were having and asked to be let in on the deal. A gas pump was installed and two more hangars built.

Now the Snyders' meadow has become a rendezvous for lots of weekend visitors who fly in to picnic and the whole show is a painless example of how much flying can be done on a mechanic's salary if the mechanic additionally has the head and heart to make flying fit him rather than to grouse because he can't fit into flying.

—ELVIN S. CARLISLE

wide, but I had such poor control that I could turn but a few degrees to avoid the tallest tree. In almost a quarter mile of free flight I managed to climb only about ten feet. It was not a loss of power. I had plenty of rpm so figured it was dead air, or an evening downdraft. I did not see the leaves on the tall tree in motion as the plane struggled over the grove but, when I went by on the next pass upwind, the wind was blowing in the tree tops. On the climb at the south end of the field the plane shot up to several hundred feet as though I had jato bottles.

Then I turned around and made the next pass wide open down the field with a diving start and turned slightly in the climb to avoid the grove. This time the plane climbed up about even with the tallest tree. On each succeeding pass, the same thing happened. Upwind the climb was magnificent but downwind it "stunk". By morning I had determined to find out what "cooked". We were able to dust two loads before the wind came up. The initial conditions were dead calm on the ground but there was a wind waggling the top branches of tall trees. The difference between upwind and downwind climbs was not so exaggerated as the previous evening but still showed a readily obvious variation.

During the next few days, I made as many upwind and downwind passes as possible and found a consistent variation, although it was never so marked as the initial experience of that first evening.

As to why the wind gradient is more developed in a temperature inversion, it seems logical that stable air with a minimum of vertical motion would be able to slip layerwise most easily. Mr. Schultz also explains what often results in turbulent air. The gradient perhaps is not so pronounced but tends to generate "rollers" in which a cylindrical mass of air rotates between the ground and the air above, much as a roller between two boards. If an airplane is banked and turning downwind when it enters one of these rollers, there will be an over banking effect which may roll the airplane out of control. These become noticeable after sunrise at about the same time the surface wind precluded further dusting.

If things begin to get rough when there is a wind gradient, it is a good time to go eat breakfast. As for what is the best way to keep out of trouble:

1. Check for extreme wind drift at about 200 feet.
2. Do not plan to climb readily if you must make a downwind pass during these conditions.
3. When turbulence begins to become evident, refuse to fly.

The pilot who never flies near the ground may wonder if all this has any importance to him. Never ignore the wind direction, even though it may be nearly calm. A take-off downwind in a wind gradient can be dangerous because the near calm conditions at the ground will not forewarn you that the first 200 feet altitude may come painfully slow. So cast an eagle eye to the wind. END

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